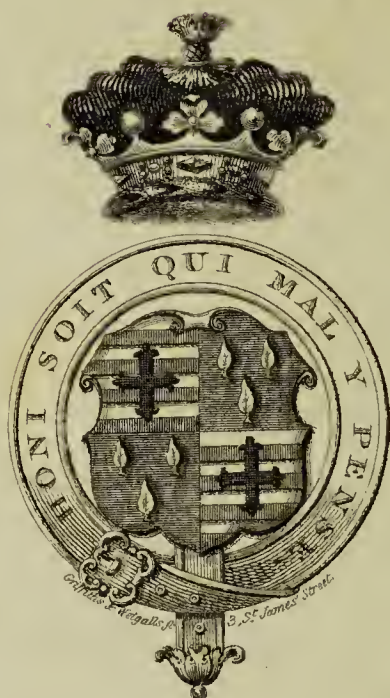


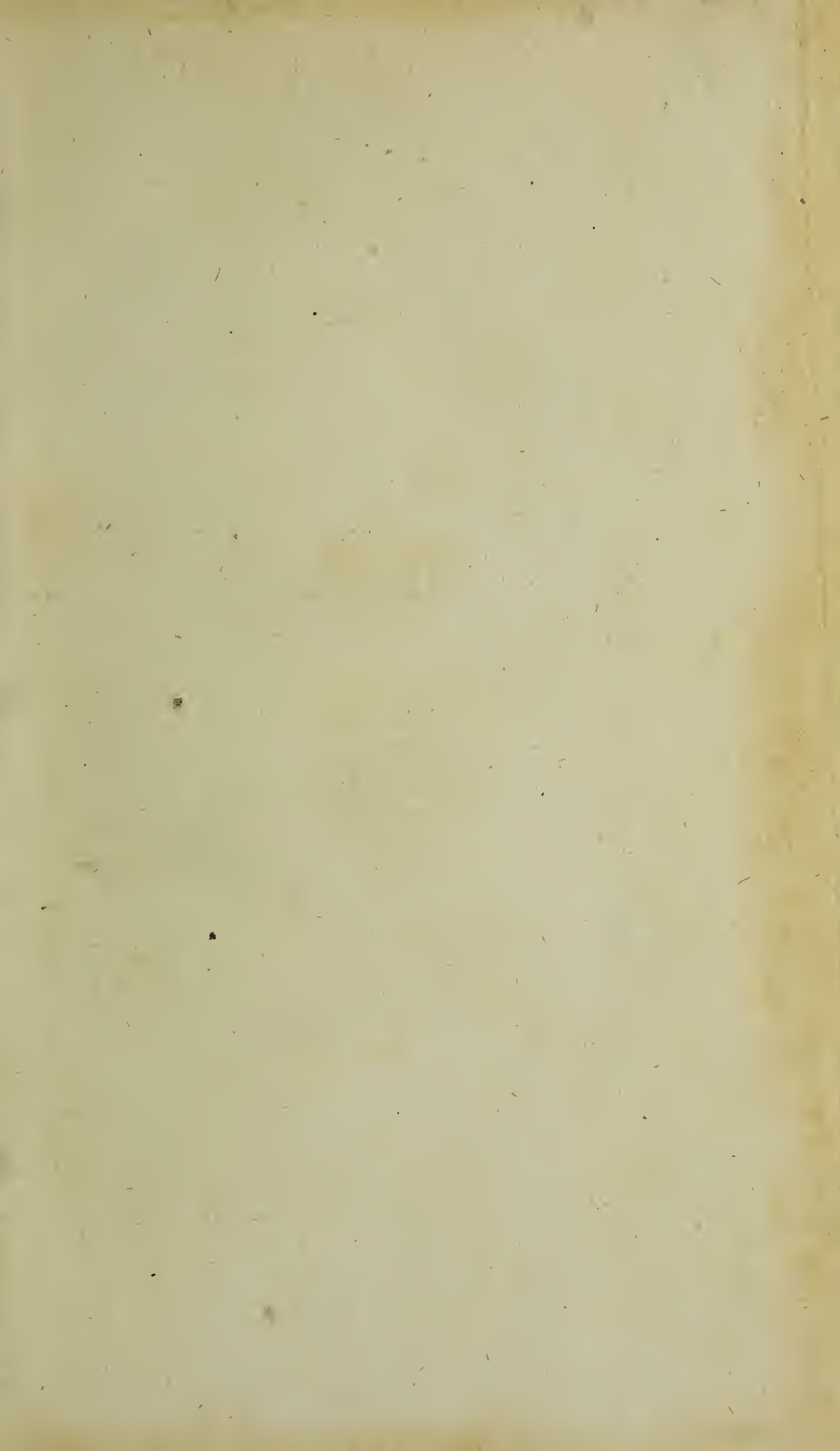


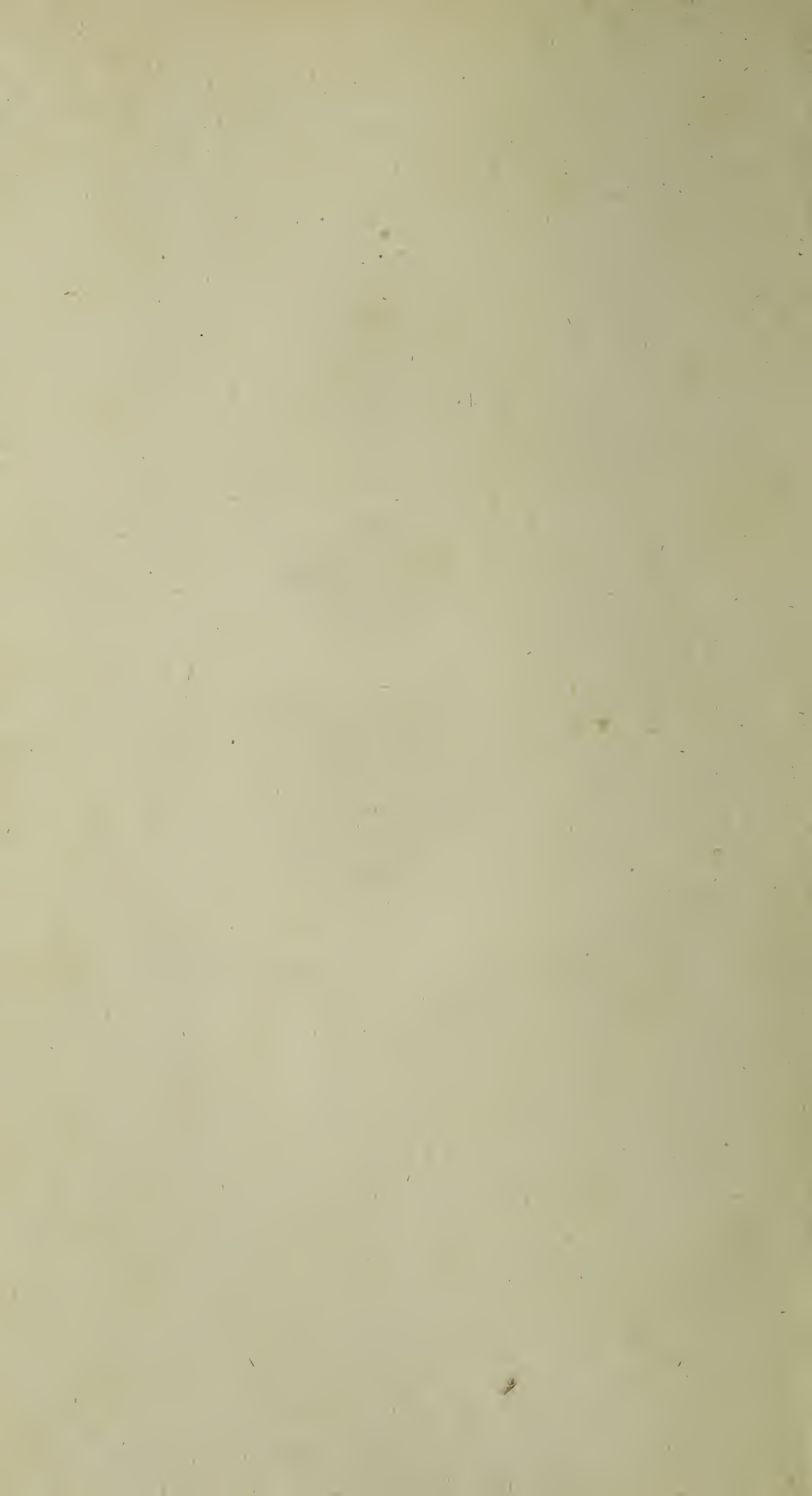
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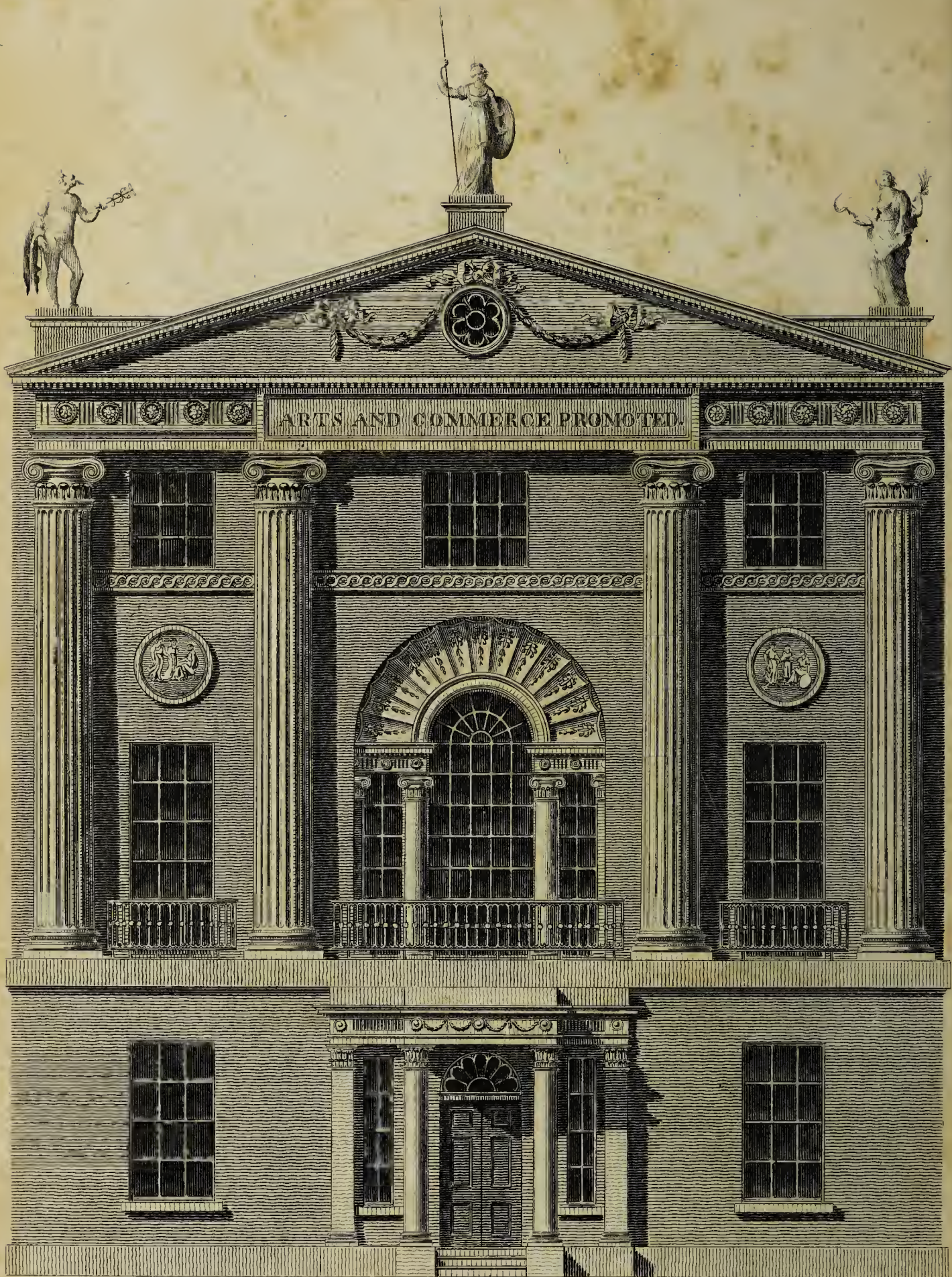
The Marquis of Stafford.

S.
24-11-06
1661









I. Taylor Sc.

Elevation of the Society's House,
designed by ROBERT ADAM ESQ.^R

T R A N S A C T I O N S

O F T H E

S O C I E T Y

I N S T I T U T E D A T L O N D O N

F O R T H E

E N C O U R A G E M E N T

O F

A R T S, M A N U F A C T U R E S,
a n d C O M M E R C E ;

W I T H T H E

P R E M I U M S o f f e r e d i n t h e Y E A R 1 7 9 0 .

V O L . V I I I .

L O N D O N :

Printed by T. SPILSBURY and SON, Snow-hill.

To be had, by MEMBERS, of the REGISTER, at the SOCIETY'S
House, in the ADELPHI; and sold by

Messrs. DODSLEY, HOOPER, ROBSON, LOCKYER DAVIS, WHITE,
BECKET, JOHNSON, CADELL, ELMSLEY, WALTER,
RICHARDSON, DEBRET, SEWELL, and TAYLOR.

[Price FOUR SHILLINGS.]

M. DCC. XC.



P R E F A C E.

THE Print prefixed to this Volume represents the Front of the Society's House in the Adelphi Buildings, London, according to the original design: some little deviations were found necessary in finishing the Building; but it has been judged most proper to lay before the Public a correct elevation, as first intended; which will give to posterity some idea of the style adopted by the ingenious Architect, Robert Adam, Esq. to whom the Society are obliged for the Drawing from which this Print was taken.

The perusal of the Papers which form this Volume will, it is hoped, afford much

pleasure to the Public at large, and to the Members of the Society in particular, when it is observed how much Agriculture, and the other useful Arts, are advancing in this country; and when the List of Rewards bestowed is attended to, it may be said, without vanity, to be under the auspices and encouragement of this Society.

In the class of Agriculture, the large plantations of useful Timber-trees making in most parts of the kingdom, must afford great pleasure to every reader: and the various other matters that will be found under this head will shew that the practical farmers in this country are attending to a line of science in their profession, unknown in former times, and from which the happiest effects may be predicted. This is evident in the Papers on the Cause and Cure of the Disease called the Curl in Potatoes—the experiments on feeding Cattle with that useful and prolific root—and from the observations on Stall-feeding Horses, a prac-
tice

tice which promises to be of very considerable utility.

Under this head will also be found some Papers on the Culture and Cure of that useful drug, Rhubarb ; from which it will appear that this country may soon be supplied with Rhubarb of our own growth, equal, and perhaps superior, to any imported. The Papers on gaining Land from the Sea, and on the management of Bees, it is believed, will prove very acceptable to the readers.

In the class of Chemistry is inserted an account of a simple, plain, and effectual method, verified by trial before a Committee, of a method of Generating Yeast ; by which the inconveniences attending the want of that necessary ingredient in brewing and baking may be in a very great degree obviated ; a circumstance of no small importance to those families who reside much in the country, particularly when at a distance from public breweries.

The Silk received this year in claim of the premium for that article is a sufficient proof, if any further proofs were necessary, that what has been published in the Volumes of these Transactions concerning the practicability of producing, in this country, that great article of manufacture and trade, is well founded ; and from the sample sent by the Candidate (part of which is reserved for the inspection of the curious), there now seem only wanting sufficient plantations of mulberry-trees for feeding the worms, whereby employment for numbers of women and children may be furnished, and Silk produced in England equal to that of any part of Europe. This opinion will be more fully confirmed, when it is generally known that the Government of Prussia is at this time busily employed in raising Silkworms in that country, where the climate cannot be considered as more fit for the purpose than that of the land we inhabit.

In the class of Manufactures, an account and plate of a Loom, of a simple construction,

tion, are inserted; which, on examination, appeared well calculated to weave advantageously light works in Silk.

A Letter on a more minute and accurate manner of dividing Mathematical Instruments; a mode of preventing those accidents that often happen in raising large weights; an account of the successful use of the Gun-Harpoon; a method of drawing water from Ponds, without disturbing the mud; and a description and plate of an improved Hydrometer for Spirits and Worts; are contained under the head of Mechanicks. These are so fully described in the following sheets, that little need be here said of them, except that the method of drawing water by means of a machine, on the principle communicated by Colonel Dansey, has been applied to a cistern with considerable advantage; and it is evident how eligible such a contrivance is, whereby the water, for the service of houses, may be taken from near the surface of the cistern,

rather than from near the bottom, as is usually practised.

An accurate *practical* Instrument, whereby the strength of Spirits may be easily and expeditiously determined, has long been wanted; and it is hoped such an one is now found in that contrived by Mr. Quin.

Under the class of Colonies and Trade, it must be highly satisfactory to find that the Cinnamon-trees taken on board the St. Ann, a French vessel, bound from the Isle of France to Port Louis, by the Flora frigate, Captain Samuel Marshall, one of the ships belonging to the fleet commanded by Lord Rodney in 1782, are now flourishing in Jamaica, and promising in time to furnish a valuable article of commerce to these Kingdoms.

Under this head it may be proper to observe, that the Society have received this year, from Jamaica, a quantity of Cashew
Gum

Gum, sent in claim of the premium offered for that article, and for which the premium was adjudged to the Candidate, Dr. Titford. This kind of Gum was found on trial not to answer the purpose of Gum Senegal in callico-printing; but, as it will supply the place of that Gum to the black-silk dyers, who consume large quantities, and will thereby lessen the price of Gum Senegal to the manufacturers in general, the Legislature, in consequence of this information, have thought proper by law to enact, that the importation of Cashew Gum shall be allowed on the same conditions as Gum Arabic or Gum Senegal; the duty on which, from the place of growth, is only sixpence per hundred weight.

The annual publication of these Volumes of Transactions appears to have had the effect desired, by diffusing a knowledge of the intention and views of the Society; and the number of Candidates who have appeared in claim of the rewards offered, which

which has been much greater during the last session than for several years past, with the increase of Members elected, must be attributed to the Public being more fully informed of the patriotic views of the Institution.

In the List of Premiums now offered, several new ones will be found; which, it is hoped, will stimulate the ingenious to bring forward such improvements as may do credit to themselves, and promote, in the most essential manner, the Arts, the Manufactures, and the Commerce of these Kingdoms.

CONTENTS.

C O N T E N T S.

	Page
Preface	
Papers in Agriculture	1
Paper in Chemistry	139
Paper in Manufactures	161
Papers in Mechanicks	173
Paper in Colonies and Trade	205
Rewards bestowed from January 1st, 1789, to June, 1790	221
Presents received	239
Catalogue of Models and Machines	245
List of Officers, &c.	249
Premiums offered in 1790	253
List of Members	353
Index	393

E R R A T A.

Page 33, line 5 from the bottom, for *cure* read *procure*.

41, line 7, after the word *longest* add an asterisk.

P A P E R S

I N

A G R I C U L T U R E .

A G R I C U L T U R E .

THE GOLD MEDAL, being the Premium offered for Acorns, was this year adjudged to JOHN MORSE, Esq. of Norwich, from whom the following Letter and Certificate were received.

THIS is to certify, That John Morfe, of Norwich, Esq. had twenty-five acres of land, all well fenced, in the parish of Sprowston, in the county of Norfolk, set with Acorns, between the months of October 1788 and March 1789, for the purpose of raising Timber and Underwood: the plants are healthy and vigorous; and there

4 AGRICULTURE.

are more than three hundred upon each
acre.

JOHN MORSE, Norwich.

WILLIAM FOX, Sprowston.

EDWARD DAVY, Churchwarden.

THO^s CHAMBERLAIN, Overseer.

JOHN GAPP, Curate of Sprowston.

October 26th, 1789.

S I R,

THE twenty-five acres I had set with Acorns last spring, are of various soils.

Six acres were arable land, of a good loamy soil, approaching to brick earth; were set with Acorns, in rows at six feet distance, in furrows, and ploughed in with wheat, with no other trees intermixed.

The remaining nineteen acres were heath land: the soil differs; part rich good loam, some sandy, and some gravel. This land was set in rows, at six feet distance, three rows of Acorns and one row of Scotch firs, in order to nurse up the Oaks.

I am, SIR,

Your humble servant,

JOHN MORSE.

Norwich,
December 31, 1789.

Mr. MORE.

B 3

The

The GOLD MEDAL, being the Premium offered for planting Chesnuts, was this year adjudged to Mr. JOSEPH COWLISHAW, from whom the following Letters and Certificates were received.

S I R,

I HAVE planted six acres of land, on Carlton Forest, with Spanish Chesnuts: the number of Trees on each acre is more than twelve hundred, and as many Larches.

The soil is sandy, and sown with a quantity of Acorns and Ash Keys. A verge, six yards broad, on two sides is filled with a variety of Forest-trees, twelve or fourteen sorts.

The six acres were well fallowed in 1788. In March 1789, I opened furrows at about
six

six feet asunder, wherein were sown twenty bushels of Acorns ; and twelve bushels of Ash Keys, broad-cast. Between the drills of Acorns are planted seven thousand six hundred and fifty-six Spanish Chesnuts, one-year-old seedlings ; and the same number of Larches, two years old, transplanted at two feet nine inches distance. They are so planted, that when the Larches are taken out, the Chesnuts will stand at six feet distance. The verge on two sides, six yards wide, and three hundred yards long, is filled with Oaks, Spanish Chesnuts, Larches, Limes, Acacias, Berry-bearing Poplars, Caledonian Laburnum, Lord Middleton's Oak, Spruce Firs, Scotch Firs, Balm-of-Gilead Firs, Weymouth Pines, Birches, Mountain Ash, and Arbor Vitæ, one in a yard. Few of the plants have failed : every dead tree has been replaced this autumn. The Chesnuts, Oaks, and Larches, seem to do well. The Ash Keys, which were of last year's growth, do not yet appear. It is my intention to make this planting a thick underwood ;

and the Chesnuts and Oaks to remain for timber.

I am, SIR,

The Society's and your

very humble servant,

JOSEPH COWLISHAW.

Hodsock-Park.
26 October, 1789.

Mr. MORE.

THIS certifieth that we, whose names are underwritten, have viewed the above-mentioned planting, and believe the account to be a true one, being effectually fenced and secured to grow timber.

ROBERT RAMSDEN, of Carlton-Hall.

T. HUME, Rector of Carlton.

IN a subsequent Letter, Mr. Cowlishaw says he has added to the variety round the outfides, Alders, Cherries, Horse-Chesnuts, Crab-trees, Balsam-Poplar, Box-trees, Witch Elms, Silver Firs, American Firs, Spruce Firs, Plane-trees, Laurels, and one thousand Sallows.

The

The GOLD MEDAL, being the Premium offered for planting Elm, was this year adjudged to RICHARD SLATER MILNES, Esq. of Foyston, near Ferrybridge, Yorkshire, for having planted, agreeably to the following Certificate, twenty thousand English Elms.

And the GOLD MEDAL was also adjudged to the same Gentleman, for having planted upwards of two hundred thousand Larch-trees, as appears by the following Certificates and Letters.

S I R,

AS I was too late in my application last year for the Medal for planting the greatest quantity of Larch, I must again trouble you with an account of what I have planted this year, and request you will be so good as to present to the Society the enclosed Certificates.

The

The ground I have planted is of the most barren kind; notwithstanding which, I have the satisfaction to find that the Trees grow very well. They are planted a yard asunder, about two thousand Larch on an acre, the others mixed Forest-trees. The plantations are all well fenced. If you wish to be informed of any other particular, I beg leave to refer you to Mr. White, of Retford, who has undertaken all my planting.

I am, SIR,

Your most obedient humble servant,

RICHARD S. MILNES.

Foyston,

October 28, 1789.

Mr. MORE.

I DO certify, That I have planted for Richard Slater Milnes, Esq. at Foyston, between the 24th of June 1788 and the 24th of June 1789, twenty thousand English Elms; and from the 24th of June 1788 to the 24th of June 1789, above two hundred

dred thousand transplanted: Larch, between two and four years old.

JAMES MANN.

Foyston,

October 28, 1789.

IT having been judged necessary to make some inquiry of Mr. White, relative to these plantations, the following answer was received from that Gentleman.

S I R,

IN answer to yours of the 13th, which I am just favoured with, I must acquaint you, that I contracted with Mr. Milnes for the planting two hundred and twenty-five acres of land with different trees; and it was stipulated that there should be two thousand Larches on each acre. And as that kind of tree grows better on that soil than any other, and is a plant much esteemed by myself, and no less so by Mr. Milnes,

I

I believe the full number has been faithfully planted; which will make the distance under five feet. The plantations were all made under my direction, the person James Mann, who signed the certificate, being my servant. They are all very well fenced, and very likely to make a timber-wood.

I have the pleasure to be,

SIR,

Your most obedient servant,

THOMAS WHITE.

Retford,

January 15, 1790.

Mr. MORE.

The SILVER MEDAL, being the second Premium offered for planting Larch, was adjudged to Mr. GEORGE WRIGHT, of Anston, from whom the following Certificates were received.

THIS is to certify, That Mr. George Wright, of Anston, has planted on his estate at Gildingwells, in the county of York, eleven thousand five hundred and seventy-three Larch-trees, in February 1789, at one yard distance, on a very uneven piece of ground, the stone being taken out for lime, &c. Very few of the plants failed. The plantation is effectually fenced and secured to grow timber.

Signed by us, { JOHN CLARK, Minister.
 Nov. 2, 1789, { JOSEPH COWLISHAW.

SIR,

S I R,

I HAVE just now received yours ; and I do hereby assure you, that I signed a Certificate, signifying that Mr. George Wright had planted on his estate at Gildingwells, in the county of York, eleven thousand five hundred and seventy-three Larch ; and I further assure you, that the said Larch-trees were two years old when planted, and from nine to fifteen inches high. The trees had been transplanted.

Your humble Servant,

JOHN CLARKE.

Anston,

January 11th, 1790.

Mr. MORE.

The

The GOLD MEDAL, being the Premium offered for planting Ash, was this year adjudged to RICHARD Lord Bishop of LANDAFF, from whom the following Certificate and Letter had been received.

THIS is to certify, That, in the course of this year, I, with proper assistants, have planted for the Lord Bishop of Landaff, eleven acres with twenty thousand Ash plants, intermixed with three thousand two hundred Oaks, two thousand Elm, two thousand Beech, two thousand Sycamore, and six hundred and fifty Carolina Poplars : that all the said plants are at the least two years old ; and that they are planted in a field, on the Grove estate, near Amble-side, which is fenced with a new stone wall, six feet in height. Witness my hand,

Amble-side,
November 3, 1788.

THOMAS HARRISON.

I believe the above to be true.

Witness, JOHN BENSON,
Steward to the Bishop of Landaff.

SIR,

S I R,

I CERTAINLY signed the Certificate you refer to, respecting the Bishop of Landaff's having planted twenty thousand Ash &c. in 1788. I am now able to inform you, that the fence of the plantation is kept up with the greatest care, and that the plants in general are in as thriving a condition as can be expected.

The Sycamore and the Oaks seem at present to be more promising, in this exposed situation, than the Elm ; but the Ash, which was planted on a boggy soil, is the most promising of all. You will not be displeas'd at having some account of the Larches which were planted by his Lordship in the spring of 1788, and for which the Gold Medal was last year adjudg'd to him : they made good shoots in the following summer, but many thousands lost their tops the last year. We do not attribute this loss to the coldness of
the

the preceding winter, but to the wetness of the spring and summer of 1789; for the Larches which were planted on the dry spots seem to have suffered far less than those whose roots were more exposed to the wet. The Scotch Firs, of which we planted near thirty thousand, seem to be better able to bear a wet soil than the Larches.

I am, SIR,

Your most obedient humble servant,

JOHN BENSON.

Dove-Nest,
February 9th, 1790.

Mr. MORE.

The Society, having offered their GOLD MEDAL, or Thirty Pounds, to the person who should discover the nature and cause of the Disease in the Potatoe-plant called the *Curled Potatoe*, and point out an effectual cure, received this year the three following Papers; and being desirous of encouraging every attempt to insure success in the culture of that valuable vegetable, divided the pecuniary Premium equally among the three candidates, Mr. WILLIAM HOLLINS, Mr. WILLIAM PITT, and Mr. JOHN HOLT; whose Accounts and Certificates follow.

S I R,

HEREWITH I have sent you an account of the disease called Curl Potatoe, with a Certificate which corroborates it, not doubting your Society will judge with liberality;

rality ; and if the Society shall think it necessary for me to attend, shall be ready to do it.

I am, SIR,

Your obedient servant,

WILLIAM HOLLINS.

Berriew,

October 20, 1789.

Mr. MORE.

THE Curl in Potatoes is a disease which admits of three different stages or degrees.

- 1st. The Half-curl.
- 2d. The Curl.
- 3d. The Corrupted.

1st. The *Half-curl'd* plants have leaves somewhat long, and curled only in a moderate degree : they produce a tolerable crop, if the summer be not very dry ; but if
C 2 otherwise,

otherwise, the Potatoes will be small and watery.

2d. The *Completely-curved* plants are seldom more than six or seven inches high: they soon ripen and die. The Potatoes are generally smaller than a nutmeg, of a rusty red colour, and unwholesome as food.

3d. The *Corrupted Potatoes*, or those in which the vegetative power is nearly destroyed, never appear above ground. The seed may be found, at Michaelmas, as fresh, to appearance, as when it was set, with a few small Potatoes close to it.

The first cause of the Curl in Potatoes must be traced to the manner in which the seed was raised the preceding year.

If the Potatoes be set late in the season, that is, from the middle of May to the middle of June, in a rich soil, well manured, having a southern aspect, and if the
summer

summer should be hot and dry till (we will suppose) the beginning of August, when the blow of the plants has fallen off, then the seed will be exhausted in feeding the plant only ; and very few Potatoes will appear. Should the weather now become moist and genial, the plants, especially if they should be earthed, will blow afresh, and a plentiful crop of very large Potatoes may yet be produced.

These Potatoes are perfectly fit for use as food ; but as they were produced from the stalk of the plant, after the seed itself was exhausted, they will be defective in moisture and vegetative power : and the plants which proceed from them the following year, will be found to be curled.

Second Cause.

The Curl may be produced without manure or earthing, provided the Potatoes be sown (at the end of May) thick together, in a rich soil, and covered with green fern,

or other litter, before the plants appear. The rain rots the fern or litter, and enables it to penetrate as a manure to the roots; and the plants are forced, as in the preceding experiment, to a second growth, and blow. The seed thus raised produced plants that were curled.

The forcing Potatoes by cultivation, as above described, I find to be the cause of the Curl, both from my own experiments, repeated for several years successively, and also from the observations I have made upon the practice and ill success of my neighbours.

It is well known that the flowers of many plants, such as the poppy, the rose, and many others, are much altered by cultivation; they become *double*, the stamina are converted into petals, the generic character is lost, they become what botanists call *Monsters*; the parts of generation being changed, no seed is produced. If I may
be

be allowed to consider any part of a plant in which the vegetative power resides as a seed, it will be found that rich cultivation produces, if not absolutely the same, at least a similar imperfection in the Potatoe; for the flower and the bulbous root are both enlarged by cultivation. In the flower, little or no seed is produced: in the Potatoe, the vegetative power is impaired or destroyed, according to the degree of the disease.

It is observable that, wherever the vegetative power is impaired, there is always a deficiency of moisture; which confirms my opinion mentioned in page 21, and is itself proved by the following experiment.

Experiment.

Both healthy and curled plants may be raised from the same Potatoe, in the following manner:

Dig up, in the beginning of October, some Potatoes raised as is described in the

preceding pages. Amongst the largest will be found some that have, in different parts, different degrees of moisture, the least at the butt, and the most at the crown end, the quantity of moisture gradually increasing from the butt to the crown. Take one set from the crown, and another from the butt: the former will produce an healthy, the latter a curled plant. The Curl-producing Potatoes are also observed to be drier both before and after boiling, and are boiled in a shorter time.

The Mode of preventing the Curl in Potatoes.

The following directions for cultivating Potatoes, duly observed, will effectually prevent the Curl; as I have found by various and repeated experiments, made with great care and attention, during these last seven years.

The best time of setting, is from the beginning of April to the middle of May.
Make

Make ridges a yard afunder : put your manure first into the trench, and with moderation : set the Potatoes in a triangular form, five or six inches afunder ; cover them with the foil to the thickness of five or six inches. There is but little danger of laying on too much of the foil : the deeper are the sets, the better will they be protected from the scorching heat of the sun, if the season should be dry. This distance of five or six inches is so small as to prevent the plants growing too rank, and yet sufficient for each of them to be exposed to the sun and the air.

2dly. When they have grown to the height of six or seven inches above the ground, you must not earth them, as is the usual practice. You must take away the weeds, and may draw a little mould to them ; but you must be careful to do it before the bloffom - buds appear, which time is generally about the end of June.

They

They will now require no farther care, excepting that of weeding.

I am of opinion that early setting is advantageous, on account of the greater chance of early rain, which will be very beneficial to the plants if the summer should be dry. By this process, the plants will be healthy; the young Potatoes will be formed in due season; they will grow gradually; the plant will ripen and die in due time, and will not be forced into a second growth by the rain which may fall in September. The sap being thus left in the Potatoe, it becomes a *seed* endued with an unimpaired perfect vegetative power; and the plants which are raised from them will be found to be entirely free from the Curl.

N.B. The Potatoes may be dug as soon as they can be handled without crushing the peel, that is, about the end of September.

Sound

Sound Potatoes are procured with the greatest certainty from earth that has been peeled and burnt : the soil thus prepared is well suited to the growth of Potatoes. In this they grow gradually, and are not forced beyond their natural size : in doubtful seed, it is safest to plant the smallest Potatoes *whole*.

The soil the most likely to produce the Curl, is that which is rich in itself, much manured, and has a southern aspect. In other situations, where the soil is not rich, and the garden is cold, either from its being upon the side of a hill, or exposed to the north, the Curl has not yet appeared ; which is known to be the case in the mountainous parts of Radnorshire and Montgomeryshire. This is perfectly consonant with my theory ; for where the soil is poor, and the situation cold, the plants cannot be forced into a second growth by earthing and manure.

I do

I do not mean to dissuade those who are anxious to raise large crops for immediate use, from earthing and manuring to the utmost extent ; I only caution them against using Potatoes so raised, for seed. By earthing and manuring, you will doubtless raise large crops of large Potatoes perfectly good, as food, but imperfect as seed ; for the vegetative power will be impaired by this forcing cultivation. Hence it will be the interest of every prudent cultivator, to allot a portion of his Potatoe-garden to the raising of Seed-Potatoes. If the directions which I have given be followed, I have not the least doubt of success ; at least I am certain that the Curl will not make its appearance.

To the Honourable the President, Vice-Presidents, and Members, of the Society for the Encouragement of Arts, Manufactures, and Commerce.

WE, whose names are hereunto subscribed, have for many years last past bought our Seed-Potatoes from William Hollins, of the township of Heel, in the parish of Berriew, in the county of Montgomery, gardener; and do hereby certify, that the crops arising therefrom have, from time to time, grown up sound and good, and free from Curl: but if we at any time happened to keep seed therefrom of our own cultivation, which we severally attempted, the crops, after the first, second, or third sowing, would get curled and unsound (in common with those of our neighbours who did not happen to purchase their seed from him), to our great detriment and loss, and to the loss of the neighbourhood

in

30 A G R I C U L T U R E .

in general. Witness our hands, this 16th
day of October, 1789,

J. JONES, Justice of the Peace for the
County of Montgomery.

ROB. WILLIAMS, Minister of Berriew.

JOHN DAVIES, Church-warden.

RICH. PRYCE, Vestry-clerk.

And seventeen Farmers and Inhabitants
of the neighbourhood.

SIR,

S I R,

I TAKE the liberty of troubling the Society with my experience on the culture of Potatoes, in answer to their following propofal.

“ For discovering the caufe, and pointing out the cure of Curl in Potatoes, verified by experiments, the Gold Medal, or Thirty Pounds.”

Having been a grower of Potatoes upon a confiderable fcale, for thefe ten years, I write wholly from experience: my annual growth has generally been from five hundred to one thoufand bufhels. I have frequently had a few curled, but not for feveral years, unlefs I planted curled forts in fmall quantities, on purpofe for obfervation.—The Curl in Potatoes is doubtlefs owing to a degeneracy in the feed; to the particular fpecies, or variety, being worn out; by too great a fameness,

famenefs, and too long planting on the fame fort of land: and this degeneracy is by no means peculiar to the Potatoe; every known plant, and perhaps even animal, is fubject to a fimilar degeneracy. Wheat, fown too long on the fame fpot, without changing the feed, will generally become fmutt and hen-corn. I have known barley, by being fown nine or ten years on the fame kind of foil, degenerate to the lightnefs of oats; and oats, from the fame caufe, become little more than hufk and chaff. Peas, too long fown without change, ripen later, and become fo unkindly, that the pods, on the upper part of the haulm, never fill. To continue the fame idea, and apply it in an inftance or two to the animal creation, I have known a good breed of hogs, by repetition of breeding male and female from the fame farrow, become fo rickety, that they could not be reared; and have very credible accounts of the fame effects taking place in
the

the human species, by confining intermarriages to two or three families for generations.

I hope this digression will be excused, as tending to illustrate the main subject, by making the cause of the disorder, in question, apparent.

The cure, I have no doubt, consists in planting sorts that have hitherto retained their health and their perfection (and many such sorts there are; fresh varieties are annually raised, and may be multiplied almost to infinity, by sowing the Bell or natural seed of the Potatoe): and indeed it is the duty, as well as interest of every cultivator, whether of Potatoes, or any other vegetable, to cure his seed from as perfect a plant as possible, and by no means to use the seed of a worn out, degenerate plant.

I have never understood, that the Curl in Potatoes has been, in this country, by

D

any

any means formidable to the attentive cultivator. No one in their senses would plant a degenerate sort but upon a narrow scale, nor indeed is there the least occasion; for the bounty of nature has always at hand plenty of substitutes, equal or superior in quality to former sorts, even when they were in perfection. The varieties that I have known fail by curling, in this country, are only three: their provincial names are, first, an early sort, called here, Pretty Bettys; in lieu of which are introduced Champions and Golden Balls, both excellent early sorts: secondly and thirdly, the old Winter Reds, and Pink Eyes, have both failed, and we have, instead of them, Aylesbury Whites, the Cluster Potatoe, the Ox Noble, red and white Surinam for cattle; a dark purple kind, called by some, the Pomegranate Potatoe; and many other valuable sorts, which never have yet curled. The rational remedy therefore, undoubtedly, is the raising and introducing of fresh varieties; a practice which has never yet been interrupted by any difficulty.

Whether

Whether any thing herein does or does not meet the wishes and views of the Society, they and the public are welcome to my trouble, who am,

SIR,

Your very humble servant,

WILLIAM PITT.

Pendeford, near Woolverhampton, Staffordshire,

October 20th, 1789.

Mr. MORE.

ON the cause and prevention of the Curl in Potatoes, I beg leave to offer the following thoughts, being a subject of no small importance to the farmer, and to which I have paid not a little attention.

The cause of this disease, as far as I can judge, does not arise from peculiarity of soil, variety of manure, difference of season (dry or moist) : the cause therefore, whatever it may be, it should seem, originates from the set, which, when once infected, I imagine, is incurable ; and the disease or curl appears to be nothing more than a total degeneracy of the plant, by being worn out, through want of change of feed, upon the same soil, with probably some other causes co-operating.

It is a well-known fact to every experienced farmer, that almost every species of grain and vegetables require repeated renewal,

or

or change from different soils ; or they wear out (as the phrase is), yield but imperfect crops, if continued too long ; and defeat the cultivator in his expectations of reaping benefit. Why may not this too cause the same effect in Potatoes, by their being too repeatedly planted, and occasion the blasted, early-matured appearance of the stems, which is always followed by a failure of crop.

In confirmation of the above theory, this district, for some years, suffered great injury from curled potatoes. As the disease had but then lately made its appearance, the cultivators were at a loss for a remedy.— This was obtained by totally discarding their former seed-plants ; and of late years, large quantities have been annually imported from Scotland.

This practice has been attended with success : few crops, I believe, I may venture to say, none, has been infected with the disease, if renewed ; but if the same seed

was imprudently, for a few years, continued upon the same soil, some plants would appear infected; and if still continued longer, the disease, instead of being *partial*, would soon become *total*, with few exceptions. The custom now is, to import every year from Scotland.*

There may be other reasons, which cause a degeneracy or wearing out of the plant.— Every seed has its peculiar season, when it is most proper to be committed to the earth. In some, the budding of certain plants, or the blowing of flowers, indicate this precise moment to the attentive cultivator: the month, or even the day of the month, is his only guide in others. To a few of these, the most favorable time is very limited, so very limited, that the winter

* Since writing the above, I have been well informed, that the sets obtained from moss lands, will make a sufficient change; and that it is universally the practice of those who live in the neighbourhood of moss lands, to procure their Seed-Potatoes from thence; and that this change of soil preserves them from the Curl.

ter turnep will not (in this district) yield a crop, if its seed be not sown within a very few days before or after the 20th of July; but better, if five days before this period, than the same number of days afterwards. From the 20th of March to the end of April, is a proper season for planting most of the kinds of the winter potatoe: but this root, the friend, and great support of the labouring man, is not so very shy of her favours; productive crops have been obtained, when planted even in July.—Time, however, for acquiring sufficient maturity, is not allowed from such late planting; for the crop, though productive, is not perfect, being neither so solid, nor palatable; and this may be one cause of accelerating a decay, or bringing on the Curl.

The Potatoe is also liable to other disorders: in very dry seasons, excrescences will arise, vulgarly called the Scab; in moist seasons, little holes or cavities appear,

called the Canker ; and both these disorders increase according to the length of time they remain in the earth, after having acquired maturity. It is more than probable, that these disorders may hasten the decay, and cause the Curl.

One method of preventing the disease, namely, by changing the seed, has been already mentioned : another source of prevention offers, from raising new kinds from the seed or apple of the plant, or the same kinds renewed again from the seed. Raising new kinds from seed, however, requires no small portion of discernment ; for the seed from the same plant, will produce so many varieties, that it requires nice judgment of the cultivator properly to select. Great numbers, from inspection only, will be weeded out and rejected ; and of those retained, more will be again rejected, the succeeding and following years : of the remaining few, there may different characters still exist ; such as ill or well flavoured,
close

close or coarse grained, productive, non-productive, &c. &c. Each may have their respective value : but I think it may be generally asserted, that the finer kinds sooner degenerate ; the coarse kinds, which are almost, if not always, more productive, retain their vigour the longest. The following example confirms this opinion.

Spring, 1785.—I procured a new kind of Potatoe, called a DABB, lately raised from seed ; where, I know not : the character of which

* This may have been the reason the disorder did not appear before the introduction of new kinds ; for it has been observed, that the old Winter Red never curled. Refinements of every sort have their advantages and disadvantages. By the introduction of new kinds, we obtained superior Potatoes, but more liable to decay : and yet the superior qualities of the new, it is likely, would supersede the cultivation of the old Winter Red ; probably a coarse species, but well thought of, when there were no better sorts.

I have been told that a valuable apple for cyder is worn out ; nor can all the efforts of the cultivator renew it from grafting. If this be a fact, there seems a striking analogy in the decay of each, from too long planting on the same soil, and it requires the industry and ingenuity of man, to seek out fresh stocks from the first source, Seed.

which was, large, coarse grained, strong flavoured, and of course rejected from the table; but being very productive, was useful for cattle. The last year, it was so much improved, as to be no longer rejected: it still retains the quality of being productive, even so much as yielding, this present year, six bushels from every statute perch. It should be observed, that the present very luxuriant crop may be in great measure owing to having been planted on a virgin soil, which was never before improved, or broken up; very little dung was used. Here is an evident change for the better; the plants are vigorous, and there is at present no appearance of decay: this new soil may be a means of preserving the plant a few years longer; but a total change of seed will, in time, become absolutely necessary.

Hence it should appear, that although the disease, after the present stock has been, to a certain degree, infected, can never be cured, yet means may be taken for prevention: and that this is the case in this district,

strict, is evident ; few crops, of late years, having failed, by being much infected with this disorder ; for, wherever the Curl has appeared, in ever so small a degree, that stock has been rejected by the attentive cultivator, and new seed obtained.

It was so late as the year 1565, when the Potatoe was first imported from its native soil, *America*, into Ireland ; and afterwards (owing, as is reported, to a shipwreck) they were planted upon the sea-coast in Lancashire, from whence their cultivation has been progressive, from the west, through every part of the kingdom ; in some of which but very lately. It is also imagined, that this disease first appeared in this very district of the kingdom wherein they were first cultivated ; and this happened about the year 1764 : a remarkable circumstance at which time, I yet well remember. A person, full of enterprise, observing the Curl in a few stems of a certain crop, and that they at the same time decayed,

decayed, or arrived at maturity sooner than the rest, had them carefully selected out, imagining he had luckily obtained, somehow, a new and early kind; and had all of them planted the next season: that he was disappointed of his succeeding crop, was evident; but from what cause, he was puzzled.

I am the more encouraged to offer you these hints, for that, after having drawn them up, in the manner here sent, I read them over to a very intelligent farmer in this neighbourhood, who said that these thoughts totally corresponded with his own. I have shewn them also to a respectable clergyman, who, to his other many excellent qualities, is always ready to communicate information, and has favoured me with the following extract from a private letter.

“ A labouring man in my neighbourhood
“ has got a very good Potatoe: the only fault
“ is, that out of four plants, three of them
are

“ are abominably curled ; on which account,
 “ I desired he would give me four Potatoes.
 “ From each Potatoe I took a *shoot*, not
 “ a *set*, in order to see if the shoots would
 “ be curled ; they were not : so, possibly
 “ their not being curled may be accidental,
 “ or possibly the curl may arise from the
 “ *set* planted. Another year, I will plant a
 “ dozen, or more, of these Potatoe-shoots :
 “ then, if there should be no curl, I shall
 “ be clearly of opinion, that the curl arises
 “ from some disease in the *set*. What I mean
 “ by a shoot, is—I put three or four sets into
 “ a flower-pot ; when they have shot to be
 “ about two inches high, and have fibres,
 “ I take the sets up, and, with a knife, cut
 “ the shoots off, leaving not the least piece
 “ of a set on the shoot. I then plant the
 “ shoots.

“ S. H.”

Hurfeley,
 22d July, 1789.

It should appear, from the above ingenious
 experiment, of which future trials will con-
 fute or confirm the fact, that it corroborates
 the above theory, by proving the disease in
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the fet; and which, when the cause or seat of disorder is lopped away, the cure is effected by the force of nature to heal itself, and the power of vegetation on the small fibres, which retain newly-acquired life, though from an infected parent stock.

The nature of vegetation is so mysterious, that we must acknowledge our ignorance in her wonderful process. We know that many varieties of fruits may, by a single bud of each, be inoculated upon one and the same single stock; and that, from this *one* root or fountain-head, may be obtained the different fruits therein deposited: but by what law of attraction or repulsion, this common stock or parent can divide, assimilate, correct and adjust, the different particles of matter of which each fruit is distinguished, by shape and flavour, is beyond our reach to know. It is true, that but a very small part of the food of plants or fruits is filtered through the roots of the plants: the leaves, the bark, the wood,
imbibe

imbibe from the atmosphere, and perform their task; but being of different shape, texture, and grain, each has its separate and particular mode of operation, and thereby causes different effects. Nor yet are we able to say, what it may be, that gives the different flavours to fruit; whether from the component particles of matter differently arranged, or whether from the separate and component parts being of different shapes, &c. &c. These are *secrets* hitherto withheld, and probably ever will be hid from the search of man.

I am, SIR,

Your obedient servant,

JOHN HOLT.

Walton, near Liverpool,

October 26th, 1789.

MR. MORE.

The

The following Letter and Certificates having been received, the pecuniary reward (TWENTY GUINEAS), agreeably to his own choice, was adjudged to Mr. PRES-GRAVE, of Bourn in Lincolnshire.

S I R,

IT is in consequence of the abstract of premiums offered by the Society for the Encouragement of Arts, Manufactures, and Commerce, for the year 1788, that I apply to you at present, claiming the reward of twenty guineas, for cultivating, in that year, not less than four acres of Potatoes, for the sole purpose of feeding cattle and sheep.

I shall give you a fair and candid account of the whole matter, which, I believe, your Society always wish to have.

About four years since, having heard of a few beasts that were fattened with Potatoes,

toes, some miles from me, I was induced to try the experiment, and planted an acre: the following year, I increased the quantity to four acres; and last year, to eight acres and fifteen perches, as you will find by the Certificate sent you with this. I increased my number of stalls, and other conveniences for fattening, to twice the number I had before: and during the last winter, I fattened nineteen beasts with Potatoes and Hay; part of which were sold in Smithfield, and part in our own markets: and I shall enclose you Mr. Ireland's account of seven of those beasts, that he sold at Smithfield, at one market. I have about the same quantity of acres planted with Potatoes this year; and I certainly shall continue this practice, so long as I cultivate the soil here.

The farm on which I plant the Potatoes, is in Deeping Fen: it is a black, moorish, and fenny soil, and none of it worth (nor does cost me) ten shillings an acre each year: and from this you will

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justly conclude, that it is the Potatoes, and not the hay, that fattens the cattle. The soil above mentioned is not so favourable to the production of Potatoes, as when mixed with loam : this I have proved by experience ; for, in casting our ditches, we throw out a loam and clay : these I spread on the soil ; and I find it increases the produce very much indeed.

Three boys and one man are equal to the planting for one plough : every third furrow is planted ; and the work goes on regular, so much so, that the planters do not stop for the plough, nor the plough for the planters.

Expences on each acre, as under.

	£.	s.	d.
Quantity for setting an acre, 15			
bushels, at 1s. - - -	0	15	0
Cutting - - - -	0	1	0
Rent - - - -	0	10	0
	<hr/>		
Carried over	£. 1	6	0

A G R I C U L T U R E. 51

	Brought forward	£. 1	6	0
Ploughing (no order necessary, as I set them on light, stubble land)	-	-	-	0 3 0
Planting	-	-	-	0 4 0
Hand-hoeing	-	-	-	0 5 0
Dressing up with a plough twice	0	4	0	
Throwing up and gathering	-	0	5	0
		£. 2	7	0

Produce, two hundred and fifty bushels on each acre.

When these are gathered, I lay them in a long ridge, near to my bullock stalls, about six feet broad at the bottom, and about four feet deep, bringing them to a point at the top. I then cover them with dry straw. A trench then is made, about five feet broad, and one foot deep, round the heap. We cover the Potatoes with the earth, beginning at the bottom, and covering it upwards till the whole is covered, a foot

E 2 thick.

thick. This method not only keeps out the frost, but the rain ; and is by much the best way of preserving them, as I have not had the least damage from the frosts or rain when thus covered. The method of feeding as follows.

The first thing my bailiff does in the morning, is to give to each about a peck and a quarter of potatoes (rather more or less, according to the size of the cattle), which they eat with great avidity : then to each is given a small quantity of hay : about twelve o'clock, to each is given about three gallons of water, and then potatoes and hay as before ; the same again at night, which is three times a day of hay and potatoes, and only once of water.

The Potatoes are given as they come from the heap, without the least washing, or even cleaning (which I think the best method). A bushel a day is better than a greater quantity for an ox of fifty stone, and rather more

or

or less, agreeably to the weight of the cattle. I do not approve of letting water stand by them with this food, nor giving it to them more than once a day. I give them food from doors, in the face of the cattle, and never go into their stalls, but to clear away their dung; yet I make it an invariable rule, never to feed them, when more are at rest than are standing, as I think it better to let nine wait for their food, than to disturb ten that are at rest.

I breed up about thirty young beasts every year, and contrive to have from fifteen to twenty heifers with calf every year; and as they calve, I purchase other calves, so as to give to every one a calf more than her own. Thus from fifteen heifers I breed thirty calves (each rearing two), and by this means keep up my breed and stock. I had thirty of these the beginning of last winter: all of them caught some disease, which reduced them very much, and four of them died.

I fed fourteen of the weakest of these, in the field, on Potatoes, till January last, when they were so much improved, that I struck off their Potatoes, and gave Potatoes to the other thirteen; which brought them all round, and they were in high condition in the spring.

I cannot say I have made much trial with my sheep; but I intend to fatten some entirely on Potatoes this year, and have not the least doubt of success, as some lambs I had at turneps, would leave them for Potatoes, and eat them with astonishing avidity.

Annexed to this, I trouble you with three Certificates: the first is the Surveyor's; the second is my bailiff's, or head servant; and the third from Mr. Stewart, a surgeon of great reputation in this country. Should any further information be requested, I shall be exceedingly happy to communicate
any

any thing to the Society, that they may have a wish to be informed of.

I am, SIR,

Your most obedient servant,

EDWARD PRESGRAVE.

*Bourn, Lincolnshire,
Nov. 1st, 1789.*

Mr. MORE.

I HEREBY certify, That I surveyed eight acres fifteen perches of land, which were cultivated with Potatoes in 1788 on Mr. Presgrave's farm, in Deeping Fen, Bourn, Lincolnshire.

GILBERT YOUNG, Surveyor.

Oct. 30th, 1789.

I DO hereby certify, That I have carefully read the foregoing account by Mr. Edward Presgrave, of his cultivating Potatoes

in the year 1788, for the sole purpose of feeding cattle and sheep; and that, to my knowledge, it is true in all respects, being his bailiff, or head servant, residing on the farm, and under whose charge his cattle are; and that I fed the cattle, mentioned in the letter, daily with my own hands.

GEORGE HARBY.

Deeping Fen,
Oct. 31st, 1789.

I AM perfectly satisfied that the account of Mr. Presgrave, respecting the cultivation of Potatoes, for the sole purpose of feeding cattle, is strictly true, as I have been repeatedly upon his farm at the time of their growing, and have likewise seen the cattle feeding upon them.

R. STEWART, Surgeon.

Bourn, Lincolnshire,
Nov. 1st, 1789.

SIR,

S I R,

I SHOULD have answered your letter sooner, had not illness prevented me. I signed a Certificate for Mr. Edward Presgrave. The peculiar method of feeding the cattle upon Potatoes, unwashed or boiled, gained my attention so much, that I frequently visited the stalls where the beasts were feeding.

Your most obedient humble servant,

R. STEWART.

*Bourn,
Dec. 22d, 1789.*

Mr. MORE.

Account of seven beasts sold for Mr. Presgrave, April 17th, 1789.

One, Mellish	-	-	-	18	10	0
One, Wood	-	-	-	17	0	0
				<hr/>		
Carried over				£. 35	10	0

	Brought forward	£.	35	10	0
One, Stennett	-	-	-	16	0 0
One, Linders	-	-	-	13	10 0
One, Maylin	-	-	-	14	10 0
One, Hembrow	-	-	-	13	15 0
One sent to be killed	-	-	-	12	19 0
				<hr/>	
	Total	£.	106	4	0
				<hr/>	

(Signed) ROBERT IRELAND.

*West Smithfield,
London.*

The

The SILVER MEDAL and TEN GUINEAS, being the Premium offered for Stall-feeding Horses, was this year adjudged to Mr. THOMAS NOYES, of Park Farm, near Eltham; from whom the following Account was received.

MY LORD,

FROM my having been informed of a premium being offered, by the Society for the Encouragement of Arts, Manufactures, and Commerce, this year, to those who have raised a proper quantity of green food, for the support of their horses, &c. during the summer months, I beg leave to put in my claim thereto.

I take the liberty to mention, that I have lived above twenty years upon a farm, in Hampshire, of near one thousand acres, on
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the estate of William Man Godschall, Esq. of Weston House, near Guildford in Surry; upon which I have fixed my eldest son, and have been, for some few years past, settled upon this farm, which is about two hundred and seventy acres, the property of Lady James.

Having found from experience the great utility of green food, in the summer, to feed the horses used in husbandry, and save both corn and hay; I sowed last spring about nine acres of tares in drills; and also, by way of trying the difference, about five or six acres in the broad-cast way; the old method, which, till of late, I generally used to follow.

The tares sown in the drill way, I found to turn out much superior to those sown broad-cast; the crop being greater, though the seed was only about half the quantity.

The produce of these tares was so great, as to enable me to feed all my Draught Horses, to the number of twelve, and sometimes thirteen, during part of the spring, and all the summer season, (in all, I consider about four months, from May to October), upon this food wholly, except some few beans and bran, when they worked hard. This was the case, when they ploughed some of the very strong, heavy clay land, which required from six to eight horses, when, in other parts, three or four would do as well: and in my other farm, where the land was thin and light, two horses would perform as well as six will in some parts here. Besides the horses, there were five milch cows, and a bull, fed with these vetches or tares in the farm yard.

The dung hereby produced and preserved for manure, was of course very abundant, and useful to me; much more so than had the dung been dropped by the cattle in the fields,

fields, as in that case the virtue would have been in a great degree exhaled by the sun; and in particular places, where it was dropped in heaps, and not spread, it would have done more harm than good.

Besides, when the cattle are suffered to tread in the crop they feed upon, they often destroy more by treading, than they consume by feeding. The milk of the cows is also increased greatly in quantity, by being so fed, and turned out morning and evening to water; as the cattle are kept sheltered, during the hot months, from the great heat of the sun, and prevented from being tortured by the flies in the fields, which prove very detrimental to them.

The horses were employed this time constantly in the necessary husbandry business; sometimes in ploughing land, which is exceedingly hard and heavy, as I have before observed; and sometimes in carrying
out

out manure upon the lands ; often sent with loads of hay and straw to the London market, and bringing back dung or soap ashes, to put upon the heavy land. During this time, the horses looked remarkably well, and were generally healthy and well, much better than they have been since they returned to be fed upon corn and hay.

This has induced me to sow a quantity of winter tares, which I expect will be ready to come into use in April : and, as I find it so beneficial, I intend also to have some acres of summer tares, to feed all my horses in the stable, the ensuing summer, as well as my cows in the farm-yard. As I cut some part last year, besides what I fed the horses and cattle with, I consider there was not above twelve acres consumed by them ; and each acre, considering the intrinsic value of the land the tares grew upon, which was some of the lowest quality of the farm, stood me in not more than thirty shillings an acre,

the

the value of the seed, ploughing, &c. included.

I am, with great respect,

MY LORD,

Your Lordship's

Most obedient servant,

THOMAS NOYES.

*Park Farm, Eltham, Kent,
Feb. 8th, 1790.*

The Rt. Hon. Lord ROMNEY.

The following is the Answer of Mr. NOYES to a Letter sent him by order of the Committee of Agriculture, desiring him to ascertain, if possible, the quantity of Beans and Bran consumed by the cattle during the time of Stall-feeding.

S I R,

UPON my return from my farm, near Andover in Hampshire, Saturday evening, I met the favour of yours of the 5th instant.

In answer, I beg leave to inform you, that on referring to my books, I find the quantity of Horse-beans consumed in the whole time of feeding my horses with tares, last summer, was twenty-four bushels, and ninety-six bushels of Bran.

I am, SIR,

Your obedient humble servant,

THOMAS NOYES.

*Park Farm, near Eltham,
March 8th, 1790.*

Mr. MORE.

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The

The GOLD MEDAL, being the Premium offered for cultivating Rhubarb, was this year adjudged to Mr. JOHN BALL, of Williton, who also gained the Premium for Rhubarb last year. See Vol. 7th, page 34.

S I R,

I RECEIVED your former letters, with the Gold Medal, and the Society's seventh volume of their Transactions; for which I sincerely thank them. I deferred answering, in hopes I should have been able to have sent you a sample of some Rhubarb; but the almost continual rains have prevented me from taking them up; which has determined me on making an artificial heat: and to have all the effect of the sun, I am now building a house, in the form of a hot-house, as I am satisfied that without the benefit of the sun we cannot dry it to perfection;

fection ; for the Rhubarb which I have already dried, has been on a malt-kiln, keeping up the thermometer to 80 : but this did not answer my expectations, as I could not make it appear so fine to the eye, as I could wish. Six years since, I dried about one hundred and fifty pounds in this manner ; eighty pounds of which I sold to a druggist in Bristol for six shillings per pound, and have used no other sort of Rhubarb in my shop, and have always found it to answer in every respect. As soon as my house is in order, I intend taking up a few roots for trial ; and I will acquaint the Society with every particular of my proceedings. By the severity of the winter, about fifty of the four hundred and thirty plants which I planted last year, and for which the Society adjudged me their Gold Medal, died ; but having a quantity of young plants, the vacancies were filled up, and I have again planted, this year, upwards of six hundred at six feet apart, and about two hundred at

four feet apart : these eight hundred I have dressed with good rotten dung, sifted coal-ashes, and lime which had been previously flacked, and mixed with a proper quantity of stuff taken from a mill-pond ; and, as the ground was very good, did not dig any pits, as before practised, but had it ploughed very deep.

I am satisfied that we grow Rhubarb equal to Turkey, but as yet have not been able to cure it to that perfection. I have taken up roots of five years old, that have weighed upwards of seventy pounds, and have now many roots only four years old, which, I believe, would weigh sixty pounds (I mean immediately on their being taken out of the ground) ; and the seed-stalks nine feet high. If you think some seeds would be acceptable to the Society, I will with pleasure send them. I have planted Rhubarb these several years ; and observing how they increase, after they become three years old, I intend
letting

letting some of them remain in the ground six or seven years, and am of opinion it will be of a finer quality. I shall take your advice of planting some plants among the woods; and you are certainly right, respecting the bark, as I have used it for several years past for tinctures, and find it full as good, in every respect, as the best part of the root.

I am, SIR,

Your obedient humble servant,

JOHN BALL.

Williton,
Sept. 24th, 1789.

Mr. MORE.

S I R,

YOUR letter of December 2d I received, and according to promise have sent the Society for the Encouragement of

F 3

Arts,

Arts, Manufactures, and Commerce, some Rhubarb seeds, and three different sorts of tinctures and powders, and a small quantity of *Radix* and *Cortex Rhabarbari*, which I beg the honour of their acceptance. I should have answered your favour before, but waited in hopes I should have been able to have sent the Society some large roots : but the continual rains have prevented its drying ; and the house, which in my last I told you I was building, was so damp that I could not place it therein ; and have now got it before a fire, the malt-kiln being in use, which I heretofore dried it on.

I have now only taken up eight roots, which were sown about five years since in a border before my house, of twenty feet by three, as a nursery-bed : but the roots prospered so well, that I let eight of them remain ; and notwithstanding they were so near each other, and on a very thin soil, they weighed one hundred and sixty pounds
when

when taken up. This year I shall take up about forty, and, if agreeable, will send up one whole root.

I am, SIR,

Your most obedient servant,

JOHN BALL.

*Williton,
January 4th, 1790.*

MR. MORE.

S I R,

HAVING raised, in the spring of the last year, upwards of six hundred plants of the true Rhubarb, I have taken the liberty to send a Certificate, and beg the favour of you to present it to the Society for the Encouragement of Arts, Manufactures, and Commerce. Some time since, I sent you a small box, by the way of Taunton, directed to

F 4

you,

you, containing the samples of Rhubarb, and the several preparations mentioned in the foregoing letter.

I am, SIR,

Your much-obliged

humble servant,

JOHN BALL.

Williton,
January 26th, 1790.

MR. MORE,

THIS is to certify, That John Ball, Surgeon in Williton, in the parish of St. Decuman's, and county of Somersset, hath raised, in the spring of the last year (1789), upwards of six hundred plants of the *Rheum Palmatum*, or true Rhubarb; that they stand six feet asunder each way; that they were in a very thriving state during the summer, in a southern aspect, and sandy soil; the culture, one part good rotten

rotten dung, one part sifted coal-ashes, and two parts lime which had been previously slacked, and mixed with a proper quantity of mud or waste taken from a mill-pond and often turned.

(Signed)

RICHARD MORLE, jun.	}	Churchwardens.
ROBERT DORE,		
JAMES WOOD,	}	Overseers.
ROGER MORLE,		
JOHN WINTER,		
NICHOLAS TANNER,		
T. TANNER.		

*Williton near Watchett, Somersetshire,
January 19th, 1790.*

SIR,

S I R,

YOUR favour of the 9th inst. I received; and, in answer to your request, I have seen and examined Mr. John Ball's plantation of the *Rheum Palmatum*, or true Rhubarb, and signed his Certificate, that they are planted at the distance of six feet each way: the number is six hundred and upwards, and were in a thriving state during the last summer.

I am, SIR,

Your very humble servant,

RICHARD MORLE.

Orchard Wyndham,
Feb. 3d, 1790.

Mr. MORE.

The

The Candidate from whom the following Letter, dated October 29th, 1789, was sent, in claim of the Premium for cultivating and curing Rhubarb, not having fully complied with the terms specified in the Society's advertisement, could not be admitted a claimant; but the Society, in consideration of his merit, and to promote, as much as in them lies, the growth and culture of so valuable a drug, voted their SILVER MEDAL to Mr. HAYWARD, as a bounty; whose Letters and Account are here inserted.

S I R,

HAVING been about twelve years a cultivator of the true Turkey Rhubarb, and so far succeeded as to have disposed of, and used, within the three last years, more than two hundred weight of that article; I have the satisfaction to find it approved by
 several

several gentlemen, eminent in physic, and many friends of consequence, who advised me to become a Candidate for the Premium offered by the worthy Society for the Encouragement of Arts, &c. for promoting the culture of this useful drug. I have taken the liberty of sending five pounds for their inspection: should it meet their approbation, I shall be happy, if by any information I can give, in regard to the culture and cure of this valuable British production, I may have the honour of coinciding in some degree with the generous and laudable intentions of that most respectable Society.

I am, SIR,

Your humble servant,

WILLIAM HAYWARD.

Banbury,
Oct. 29th, 1789.

Mr. MORE.

THIS

THIS is to certify whom it may concern, That Mr. William Hayward, Apothecary, of Banbury, is possessed of twenty pounds weight of Rhubarb, of the same quality with the five pounds sent herewith, of his own cultivation and curing.

Witnesses { WILLIAM WARD,
 JOHN CASWALL.

October 29th, 1789.

S I R,

I AM sorry my misunderstanding should have occasioned you the trouble of writing. At the same time I beg to return my best thanks to the Society for their kind indulgence, in allowing me an opportunity of correcting my error. I certainly intended to give the worthy Members the best account (in my power) in regard to the culture and cure of the Rhubarb submitted to their inspection ; but did not apprehend
such

such information was required at the time of presenting the article.

Having, in an extensive practice for several years, used no other, I have (exclusive of prejudice in favour of my own production) found it in every respect equal to the best Turkey Rhubarb, which I used to purchase at a high price. The saving to me yearly has been very considerable; and I doubt not, but the culture of it, encouraged by your benevolent Society, will prove a very considerable saving to the nation.

I have herewith sent my method of culture and cure, and am,

SIR,

Your obliged, and
obedient humble servant,

WILLIAM HAYWARD.

Banbury,
December 3^d, 1789.

Mr. MORE.

METHOD *of cultivating* TURKEY
RHUBARB *from Seed.*

I HAVE usually sown the seed about the beginning of February, on a bed of good soil (if rather sandy, the better), exposed to an east or west aspect, in preference to the south; observing a full sun to be prejudicial to the vegetation of the seeds, and to the plants whilst young.

The seeds are best sown moderately thick (broad-cast), treading them regularly in, as is usual with parsneps and other light seeds, and then raking the ground smooth. I have sometimes, when the season has been wet, made a bed for sowing the Rhubarb seeds upon, about two feet thick, with new dung from the stable, covering it near one foot thick with good soil. The intent of this bed is not for the sake of warmth, but solely to prevent the rising of earth-worms, which,

which, in a moist season, will frequently destroy the young crop.

If the seed is good, the plants often rise too thick ; if so, when they have attained six leaves, they should be taken carefully up (where too close), leaving the standing crop eight or ten inches apart : those taken up may be planted at the same distance, in a fresh spot of ground, in order to furnish other plantations. When the plants in general are grown to the size that cabbage-plants are usually set out for a standing crop, they are best planted where they are to remain, in beds four feet wide, one row along the middle of the bed, leaving two yards distance betwixt the plants, allowing an alley between the beds about a foot wide, for conveniency of weeding the plants.

In the autumn, when the decayed leaves are removed, if the shoveling of the alleys are thrown over the crowns of the plants, it will be found of service.

Cultivation

Cultivation of Turkey Rhubarb by off-sets.

On taking up some plants the last spring, I slipped off several off-sets from the heads of large plants: these I set with a dibble about a foot apart, in order, if I found them thrive, to remove them into other beds. On examining them in the autumn, I was surpris'd to see the progress they had made, and pleas'd to be able to furnish my beds with forty plants in the most thriving state.

Though this was my first experiment of its kind, I do not mean to arrogate the discovery to myself, having known it recently tried by others, but without being informed of their success. I have reason to think this valuable drug will, by this method, be brought much sooner to perfection than from seed.

Method of curing Rhubarb.

The plants may be taken up either early in the spring, or in autumn when the

G

leaves

leaves are decayed, in dry weather if possible, when the roots are to be cleared from dirt, (without washing) : let them be cut into pieces, and with a sharp knife freed from the outer coat, and exposed to the sun and air for a few days, to render the outside a little dry.

In order to accelerate the curing of the largest pieces, a hole may be scooped out with a penknife : these and the smaller parts are then to be strung on packthread, and hung up in a warm room (I have always had the conveniency of such a one over a baker's oven), where it is to remain till perfectly dry. Each piece may be rendered more slightly by a common file, fixing it in a small vice during that operation : afterwards rub over it a very fine powder, which the small roots furnish in beautiful perfection, for this and every other purpose where Rhubarb is required.

THE GOLD MEDAL, being the Premium offered for gaining Land from the Sea, was this year adjudged to THOMAS QUAYLE, Esq. of Reading, Berks; from whom the following Account and Certificates were received.

SIR,

I BEG you will lay before the Society for the Encouragement of Arts the following particulars of an undertaking, in which I have succeeded, in gaining from the Sea one hundred and ten acres and nineteen perches of Land in Dengey Hundred, in the county of Essex.

In that neighbourhood, there exists a general tradition, that at some distant period of time, a considerable tract of country was overwhelmed by an irruption of the sea. The name of a Saxon city, *Ithancestre*, is preserved, which is said to have

then perished. But the memorials of this calamitous event are not so well preserved, as those of the inundation on the western side of the Thames, although it could not have been long prior in point of time, or perhaps much less extensive in its devastation. Bricks are said to be sometimes raised by the fishermen dragging off this coast; and some have fancied they could discern stumps of trees in a sand-bank called the Buxey, situate at two leagues distance from the present shore.

No apprehensions of a similar calamity are now entertained on the coast of Dengey Hundred; bounded on the east by the Black-water or Malden River, on the west by the Burnham river, and extending about fifteen miles, the sea has been, for some centuries, slowly and irregularly, but gradually retiring. The owners of the adjacent land have not neglected to avail themselves of the retreat of this formidable neighbour: sometimes in concert, but more frequently

frequently by separate attempts, they have guarded against the return of the sea to the marsh, which it had left, by the erection of strong dykes or sea-walls.

Of their progressive advances indisputable proofs remain in the vestiges of three sea-walls, one within the other, on many neighbouring farms ; and it is not improbable that the plough has reduced to a level with the adjoining land, other walls still more ancient.

This recession of the sea, if seconded by a little industry on the part of the inhabitants, may restore to them the whole of that territory, of which they are said to have been deprived.

The natural shore of this whole district is at present composed of sand: on the greatest part of it, the water by which it is washed, is not of the purity observed on most sandy coasts, but on its approach to

land, and for four or five miles to sea, appears discoloured by a mixture of mud or ooze. This is deposited on the shore; and together with the sea-weed driven thither by tempests, and the shells of some species of the smaller testaceous fish, slowly accumulates, and is condensed by the heat of the sun, and the gradual discharge of the sea-water during the ebb. In the course of many years, this new soil yields some scattered marks of vegetation. The plants thus appearing, though not of much value, being principally marsh-samphire, and other coarse marine productions, have the good effect of giving cohesion to the loose soil, and enabling it to resist the waves, with which the returning tide covers it. Irregular ravines or rills are, however, ploughed up, which, as they terminate towards the sea, are shallow: nearer full-sea mark, as the land rises in height, they deepen to two or three, in a few instances to four or five feet. The intervals between these rills are very unequal; in some places there

there is a space of twenty or thirty yards between two rills ; in other places they approach so nearly, as almost to unite. However unpleasant their appearance may be, they are essentially useful to the soil : where they are wide and deep, the land is more firm and productive, in consequence of its being more completely drained during the ebb.

At some distance from high-water mark, these rills multiplying, communicate with, and intersect each other ; the oozy earth sinks in height, and is in great part covered with salt water, even while the tide is at the lowest. Here the marine plants cease to vegetate. The new land, so far down as any continued marks of vegetation are discoverable, is called *the Saltings* ; where the shallow numerous rills converge, and the naked mud appears, it is termed *the Chatts*.

These rills, communicating with the ocean, are not the only receptacles of salt water on

the new land: as it is of itself retentive of moisture, we find frequent pools of seawater in the middle of the Saltings. These are not improperly called the Pans; being, during the summer months, filled with stagnant and weedy water, they are very injurious both to the soil and the air.

It may be thought that, during the neap-tides at least, the sun has sufficient power to exhale the water in these pans; but the recurrence of the spring tides has generally replenished them before they were quite exhausted.

There is indeed a remedy put into practice by my tenant some years ago, to which I am indebted for the present superiority in value of my saltings, compared with those of some of my neighbours; and that is, the expedient of cutting drains from each pan to the next deep rill: the water having, by that means, an issue, the weeds and mud have hardly ever failed to fill up the pans.

Nearly

Nearly in the centre of the level, between the Malden and Burnham Rivers, is situated my farm, which presents to the sea a front of about a mile. Visiting it in the autumn of 1787, I convinced myself of the advantage likely to result from an embankment of so extensive a tract of saltings as were attached to it. The soil without the then sea-wall, appeared to correspond in quality with that within : each had been formed in the same manner ; and the present difference between them was such as must necessarily result from the former's being drenched at every high tide with sea-water, which often covered it to the depth of several feet. A marine plant called Crab-weed, which is thought to indicate soundness and fertility of soil, grew luxuriantly ; and the ground, at a considerable distance from the wall, was firm to the foot.

Besides those general risks which attend all such undertakings, there were however two peculiar circumstances that opposed an embankment

embankment here. The first was, that a rivulet, called Asheldon Brook, taking its rise in the centre of the Hundred, and collecting all the fresh water for some miles, here discharges itself into the sea. If we ventured on an embankment, this brook must be carried through the new wall, at no slight expence. The country being a dead flat, and the due discharge of this water being therefore of the highest importance to all our neighbours, we had to dread their opposition: on collecting their sentiments, however, no impediment arose in that quarter. I had the satisfaction to find the marsh-bailiffs, under the commission of sewers for this level, well-informed and liberal-minded men; who, far from throwing any obstacles in the way of improvement, obligingly concurred in giving every aid, and every information, in their power.

With their assistance we determined on the most secure mode of constructing a wooden gutter to convey this fresh water under the intended wall.

But

But there still remained a difficulty of a nature much more mortifying. At about two hundred yards distance from the brook, there unfortunately runs quite through the Saltings, from the old wall in a right line to the sea, a piece of low land, bottomed with perfectly liquid mud, and of the breadth of about twenty rod.

This we suppose to have been the natural channel of the brook, but that its course had been purposely diverted. Before the great accretion of land on either side, here formerly had been a creek, containing water sufficient for the navigation of small vessels. The instructions from the Board of Customs to the officer of the adjoining port of Burnham, to this day, direct him to visit *Tillingham Creek*, though it is at present so much too shallow for general use as a landing-place, that probably the name is no where preserved but in these instructions.

This Low, as it is called, traversing the best part of our saltings, we found that, in order to avoid getting on the Chatts, we should be under the necessity of altering the direction of our wall, as it crossed the Low, so as to form an obtuse angle towards the land; and also of raising the earth for the construction of the wall at some distance, that it might not be subject to the subsidence which must be expected, if formed of the soft materials the spot itself produced.

Having determined on these means of avoiding the difficulty, our plan was at length fixed, and the direction of the proposed new wall staked out. Early in February, 1788, a contract was entered into with two companies of sea-wallers, one consisting of twenty, the other of ten men, for the erection of a new wall in front to the sea, thirty-four feet wide at the feet, eight feet high, six feet wide at the top, with a slope of two feet for every foot in
height

height on the sea-side, and one foot and an half in the same space on the land-side. A ditch running parallel with the wall on the the land-side, at the distance of twelve feet, was also to be sunk, twelve feet wide at the top, four feet deep, but not to exceed the width of five feet at the bottom, to prevent the sides from slipping in.

By their contract they were restricted from raising any earth whatever from the land-side of the wall (except what the ditch yielded), or from raising any within the distance of twelve feet on the sea-side. In order that more time might be given the wall to settle, it was directed not to be raised above five feet, till the whole was carried to that height, and then the other three feet to be added.

The winds from which mischief is most apprehended on this coast, are those which blow in shore from about the north-east. This made it necessary to construct the
front

front wall of superior solidity. No great danger being apprehended from the impulse of any side-wind on the new embankment, shielded as it must be by my neighbour's uninclosed saltings, we ventured gradually to contract the width of the lateral walls, as they approached the land, from thirty-four to twenty-four feet, the height continuing the same.

For the principal wall the contractors were to receive at the rate of thirty shillings the marsh rod of twenty-one feet : for the side walls, one guinea ; they being free from the expence of barrows, scaffolding, and every other necessary and utensil, except shovels ; and claiming a recompense for filling up the deep rills, over which the wall was carried, and for extra labour in crossing the Low before spoken of. There being a space left, between the foreland of the new wall marked out and the Chatts, sufficient to afford good earth, to barrow for the wall, the work immediately commenced :

menced : sometimes above thirty wallers were employed ; at other times they fell short of this number ; but, as they worked with spirit, by the beginning of July the front wall was nearly completed, a space of about twenty-five yards being however left on each side of Asheldon Brook.

In the mean time a gutter had been cut, out of seasoned oak, for the conveyance of this brook under the wall : this was sixty feet in length, seven feet two inches wide, two feet six inches deep in the clear run, with an apron eight feet long and spread eight feet. For several days it had been the employment of eight men to prepare the spot for the reception of this gutter, by making a dam or semicircular dyke on the sea-side, five feet high, and twelve feet wide at the seat.

In passing the very channel which the fresh water had usually taken, we were obliged to construct it of still greater solidity,

lidity, stronger indeed than the wall itself. In the feat it exceeded thirty feet, was twelve feet high, and planked and piled internally.

Another slighter dam being made on the land-side, meeting that on the sea-side, in order to keep off the fresh water from the men when laying the gutter, they first cleared away all the water from the circular internal space. The bottom being found so soft and oozy, that a ten-foot pole could, without any great effort, be struck down to the end, it was thought prudent to remove the soft earth, in the direction the gutter was to be placed, to the depth of two feet, or two feet and a half, and the width of twelve feet at the bottom. An equal quantity of the dryest earth on the Saltings was then barrowed in, and rammed down as closely as possible with a small mixture of hay: the cells nine inches square, of the length of the gutter, being then put down, thirty joists, eight inches wide, and five inches thick,

thick, were dovetailed into them, and the space between the joists, and without the cells, as far as the soft earth had been removed, was closely rammed with the best earth and hay, level with the joists and cells.

The studs being next put in, the plating and the rest of the carpenter's work proceeded without any difficulty: the earth over the gutter, when finished, was rammed in the same manner as at the bottom and sides, the whole width and length of the outfall, till it was level with the Saltings, with so much care, that the men barrowing in earth employed three times their number in stowing and ramming it. The sea-wall was then carried over the gutter in the usual manner.

The hay was here made use of in a very small quantity, and merely to prevent the inconvenience arising from this tenacious earth adhering to the rammers. Piles

H driven

driven under the gutter might at first sight appear likely to have made the foundation more solid ; but I was dissuaded from using them, as it is found by experience that piles on this bottom are subject to sink unequally. This might produce a partial depression of the gutter, and a consequent failure in the due conveyance of the water to the sea.

As the slightest error in the construction or position of this gutter might be attended with ruinous consequences, not only to ourselves, but to many upland farms, we proceeded in this operation with the greatest possible caution. The progress here made was much slower than in any other part of the work : as soon as it was finished, one gang of the men soon threw up the side-walls.

By the 9th of November the whole was completely embanked, and I had the satisfaction of seeing added to the farm one hundred and ten acres of land, which I trust will

will not be found inferior to many spots in this island in fertility.

Whilst this work was proceeding, we were fortunate in having favourable weather; but the remarkable dryness of the last year, though of service to the wall, has not been equally beneficial to the new land. To clear it from the superabundance of the marine acid, with which it is impregnated, nothing would be so effectual as a long continuance of rain. In the mean time, the vegetation of any plants, besides those which nature has suited to a soil saturated with sea-water, is not to be expected: such at least is the opinion of the most intelligent cultivators in Essex.

Different opinions and a different practice prevailing on other coasts, where recent embankments have been made, I was induced to fence off about twenty square rod, at the eastern extremity of the newly-gained saltings, in which the experiment of sowing

various plants was made in the last spring : but the result has proved the opinion of the Essex farmers to be well founded, at least with regard to their own soil : no one plant has shewn itself above ground, except white mustard, and that vegetated but weakly : some wheat transplanted lived as long as it found nourishment in the mould removed with its roots ; when they struck into the salt land, every plant perished : the same ill success attended an attempt to sow the wall with ray-grass and clover. The experiments shall however be repeated on a larger scale, and with different kinds of manure.

As soon as the work was completed, one of the best wallers was engaged to reside on the farm, and be constantly on the watch, during the winter months, lest any flaw should happen in tempestuous weather : but, though the sea has every where occasionally risen to the height of four or five feet on the wall, and where it crosses the old creek,
the

the waves appear to have rolled to its very summit, no material damage has been sustained, nor any salt water got admision into the new land: where a small quantity of earth has happened to be washed from the side of the wall, this man alone immediately filled up the breach, and has also been employed in making good the foreland, where any traces of the old rills were left. Out of abundance of caution I have also directed the whole foot of the wall to be planked and piled through the Low, and a couple of small breakwaters, twelve or fourteen inches high, extending from the wall to the end of the foreland, to be added in the most exposed places: as the old planks used in the scaffolding answer for this purpose, it is done at a trivial expence.

The appearance the new land has already assumed, much exceeds every one's expectation: it is now sufficiently solid to bear a horse; the rankest sea-weeds daily disappear; not a drop of water stagnates upon it; the

earth is cracking round the rills, and beginning to fill them without any aid; and we trust that in a very few years the land will be in a state to receive the plough: it is however fitted by nature rather for pasture than arable land, and has the advantage of being so disposed, as that fresh water may be laid into every separate marsh or division.

Besides the direct benefit obtained by the acquisition of so much land, before nearly useless, and now capable of conversion to the most valuable purposes of agriculture, there result from it indirect advantages, by no means contemptible. In consequence of the subsidence of the new land, and the more perfect cleaning and deepening the sluices, the whole farm is more completely drained, and the brackish water which now fills the lower ditches of the old land will soon give way to fresh.

By this embankment we attain another important object. Our duck-decoys, to
which

which agriculture itself must in some measure be subservient, have hitherto suffered much from the molestation of persons walking on the old wall: whilst the adjoining saltings lay open, it was impossible to protect ourselves from these intruders: they may now be kept at a much greater distance.

It would be injustice, were I to assume to myself the merit (if merit there be) of this undertaking: of any peculiar ingenuity, or even industry, of my own, I cannot boast. The circumstance which led me to engage in it, was the account of Mr. Harriott's embankment, contained in the fourth volume of the Transactions of this Society. Had it not been for the information communicated to the public by the means of this truly patriotic body, it is probable I should not have thought of this work, and perhaps should never have visited the place; which, though it produces some of the best corn in

H 4 England,

England, is not blessed with the purest atmosphere.

It will not indeed be easy to select two objects of greater national importance, than those to which the wisdom of this Society extends its peculiar protection; the enclosure of moors, and embankments from the sea. The efforts of individuals, in converting to tillage soils before unproductive, add doubly to the riches of the State: at the same time that the general population is advanced by the employment of the husbandman on what may be termed a new creation, a surplus of food is raised for the use of the manufacturer, or for foreign consumption,

In communicating to the Society the result of an undertaking which owes its origin to them, I do but acquit myself of a duty imposed on me by every consideration of gratitude and respect. I beg leave to enclose an account of the expence attending

tending this work, with a Certificate of the quantity of land embanked, and am respectfully,

SIR,

Your very humble servant,

THOMAS QUAYLE.

London,
30th June, 1789.

Mr. MORE.

ACCOUNT

*ACCOUNT of Expence attending Embankment
from the Sea of one hundred and ten acres
and nineteen poles of Land, in the Parishes
of Tillingham and Dengey, in the County
of Effex, in 1788 and 1789.*

	£.	s.	d.
P AID making 315 rod and one half of sea-wall, at thirty shillings by the marsh rod of twenty-one feet -	473	5	0
55 rod, at one guinea - -	57	15	0
Paid wallers for extra labour in crossing the old creek -	10	0	0
Paid ditto for ditto in filling up the larger rills, over which the wall passed -	4	4	0
Gratuities paid them - -	2	2	0
Paid carpenter for 30 wheel- barrows used in the walling	15	15	0
Iron work in ditto - -	7	0	0
	<hr/>		
Carried over	£. 570	1	0

A G R I C U L T U R E. 107

Brought forward £. 570 1 0

Paid for wooden boxes or frames, made to support the scaffolding for the wall-ers - - - 7 2 0

Timber-merchant's bills for planks and battens used in the scaffolding - - - 34 7 9

Carpenter's bill, for materials and workmanship, laying an oak gutter under the wall, sixty feet in length, with doors &c. - - - 150 9 0

Paid wallers for their labour in preparing the place for the reception of the gutter, and assisting to lay the same 22 3 6

Blacksmith's bill for work about the gutter - - - 6 6 6

Carriage of the materials of same - - - 7 10 0

Carried over £. 797 19 9

Brought forward	£. 797	19	9
Paid a person for staking out the wall, overlooking and directing the whole work		29	8 0
Paid a waller for work done during the winter, in repairing flaws in the wall, making good the foreland, and other labour - -		9	15 0
Carpenter's bill, repairing barrows, and other small jobs		1	9 0
Ray-grafs and white clover-feed to sow the wall - -		1	11 0
Freight of timber from London, surveying, and other small expences - - -		3	15 0
Paid for labour in making two small breakwaters, piling and planking through the Low - -		1	4 0
Paid for sinking one ditch across the new land, 33 rod at 3s. - - - -		4	19 0
Total	£. 850	0	9

I ROBERT MUNDELL, of Billericay, in the county of Essex, land-surveyor, do hereby certify, That, on the 4th and 5th days of June, 1789, I surveyed and admeasured a piece of land, adjoining to a farm called the Grange, in the several parishes of Tillingham and Dengey in the said county, embanked from the sea by Thomas Quayle, of Reading, in the county of Berks, Esq. between the 5th day of February, and the 11th day of November 1788; and that the said land so embanked contains one hundred and ten acres nineteen perches, statute measure, exclusive of the space on which the new wall, for the protection of the new enclosure from the sea, is erected, and also of a space between such wall and a trench that runs parallel therewith, at the land side of the wall for the whole extent, at the distance of twelve feet from the same. And I further certify, That the said one hundred and
 ten

ten acres and nineteen perches, so gained from the sea, are securely and substantially embanked; and that the new wall is of sufficient dimensions and strength, being, in front to the sea, thirty-four feet wide at the base, six feet wide at the top, eight feet high, and of the length of three hundred and twenty-one rods; that the wall at the east end is of the length of thirty-six rods, and that at the west end, of the length of thirty-nine rods and nine feet; in other respects, of the same dimensions as the front wall, except that they gradually contract to twenty-four feet at the base, or thereabout. And I further certify, That the said land, so newly gained from the sea by embankment, is of a fertile nature, and may, when drained, be expected to be equal in value to any land in the Hundred of Dengey.

ROBERT MUNDELL.

Billericay,
11th June, 1789.

We

AGRICULTURE. III

We the undersigned do severally attest the truth of the facts, stated in the before-going Certificate. Dated this 15th day of June, 1789.

WILLIAM WALTHAM, Marsh Bailiff
of Burnham Level.

SAMUEL BAWTREE, Expenditor of
Burnham Level.

A. L. PEACOCKE, Curate of Tilling-
ham and Dengey.

THOMAS STUTTLE, Overseer of the
Poor at Tillingham.

RICHARD SPURGEN, Churchwarden
of ditto.

SIR,

SIR,

THE very honourable mark of approbation, with which, I learn by your letter of the 29th of December, the Society for the Encouragement of Arts have been pleased to distinguish my undertaking in Essex, has impressed me with sentiments of the most lively gratitude. No one, I beg leave to assure you, can be more truly sensible of the value of such an obligation, conferred by a body of men in every point of view so respectable. There is indeed but one reflection which gives me uneasiness, and that is, my thorough conviction how little what I have done merits an honour so much and so deservedly coveted.

So well satisfied are my neighbours with the substantiality of the new wall, and the construction of the outfall, that I understand it is in agitation to apply to the Commissioners

missioners of Sewers for this level for their interposition to oblige me to take up the old sluice ; that is, in effect, to demolish the old wall.

I will take the liberty of adding, that from the abundance of rain of late, the new land is in the best possible state : the wheat, rye, and winter tares, which have been sown by way of experiment, had speared when I heard from thence early in December, and promised this year to succeed.

I am, SIR,

Your very obliged humble servant,

THOMAS QUAYLE.

*Reading, Berks,
2d January, 1790.*

MR. MORE.

The following Account of Land gained from the Sea, at Goldhanger, in the county of Essex, was this year received, in claim of the Premium offered; but the Gold Medal being adjudged, as before mentioned, to Thomas Quayle, Esq. the Society voted their SILVER MEDAL to Mr. LEE, of Tolesbury near Malden; from whom the following Letters, Certificates, and Plan, were received.

To the President, Vice-Presidents, and Members, of the Society for the Encouragement of Arts, Manufactures, and Commerce, Adelphi, London.

MY LORDS AND GENTLEMEN,

HAVING purchased an estate at Goldhanger in this county, part of which was a salt-marsh, containing forty-two acres

acres and one rood, adjoining to the river Blackwater, near its entrance into the German Ocean, and overflowed at every spring tide, I thought that a quantity of good useful land might be gained without a great hazard: in consequence of which, in February last I began enclosing the same, leaving a sufficient foreland next the sea, and with an embankment of earth only have secured thirty acres and eighteen poles.

I have had it surveyed by an experienced workman, who declares it is not likely to want any considerable expence for many years.

The whole Charge of enclosing is as follows :

	£.	s.	d.
Waller's bill, - - -	158	4	9
One gutter, 36 feet long, one foot clear run, - -	25	0	0
Planks, barrows, &c. - -	7	7	0
Cartage, and extras, - -	5	5	0
Carried over	£. 195	16	9

	Brought forward	£.	195	16	9
It will cost about twenty shillings per acre to level the rills,	-	-	-	30	0 0
				<hr/>	
	Total expence	£.	225	16	9

The whole length of the wall is one hundred and eighty poles of eighteen feet each, the height from five to seven feet, according to the level of the soil; the seat of the bank from sixteen to twenty-two feet, and four feet wide at the top.

Finding, by the published Transactions of the Society, that you have offered rewards for gaining land from the sea, I have taken the liberty of sending the above for your consideration, and am, with great respect,

MY LORDS AND GENTLEMEN,

Your most obedient humble servant,

THOMAS LEE.

Tollesbury, Essex,
1st Sept. 1790.

Mr. MORE.

THIS is to certify, That Mr. THOMAS LEE, of Tolesbury, has since February last enclosed upwards of thirty acres of Salt-Marsh in this parish, which used to be overflowed by the sea; that the above Letter contains a true statement of the expences; and that the land is likely to turn out very valuable. Witness our hands, at Goldhanger, this first day of September, 1789,

CHARLES COWLEY, Rector,
 THOMAS PALLING, Churchwarden,
 JAMES CARTER, Overseer,
 THOMAS BECKLEY, } Inhabitants.
 JOHN ROBERTSON, }

S I R,

YOUR favour of the 23d instant was not received till this day. Be pleased to present my respectful compliments to the Society, and inform them my signature to Mr. Lee's claim was as Rector of Goldhanger, the parish in which the land was recovered from the sea; and of which I was witness, from the commencement of the undertaking to the present time.

It appears to me to be very effectually done; and I have not a doubt but the land in question will very shortly be as productive, as the fertile lands adjoining. With the highest respect for the Society, I am

Your very obedient servant,

CHARLES COWLEY.

Goldhanger,
Nov. 30th, 1789.

Mr. MORE.

SIR,

S I R,

YOUR favour of the 26th ultimo, communicating to me the vote of a Silver Medal from the Society for the Encouragement of Arts, Manufactures, and Commerce, for enclosing a Salt-Marsh at Goldhanger, I received in due course, and according to your request have enclosed a rough sketch of the Marsh I have taken in from the sea.

It might have been of great utility to the village of Goldhanger, if I had been permitted to have joined Mr. Key's wall at the place I have marked, as the tide would have been kept further from the street, and the inhabitants free from salt ditches, which are here supposed to be unhealthy; and it would also have shortened my wall full eighty poles: but the expence would have been much the same, owing to the difficulty of crossing the creek at the place I wished; however, about ten acres of land more would have been gained.

Should

Should the enclosed sketch be insufficient for the inspection of the Society, I will transmit you one properly done by a land-surveyor, when I have the estate measured.

I am, SIR,

Your obedient humble servant,

THOMAS LEE.

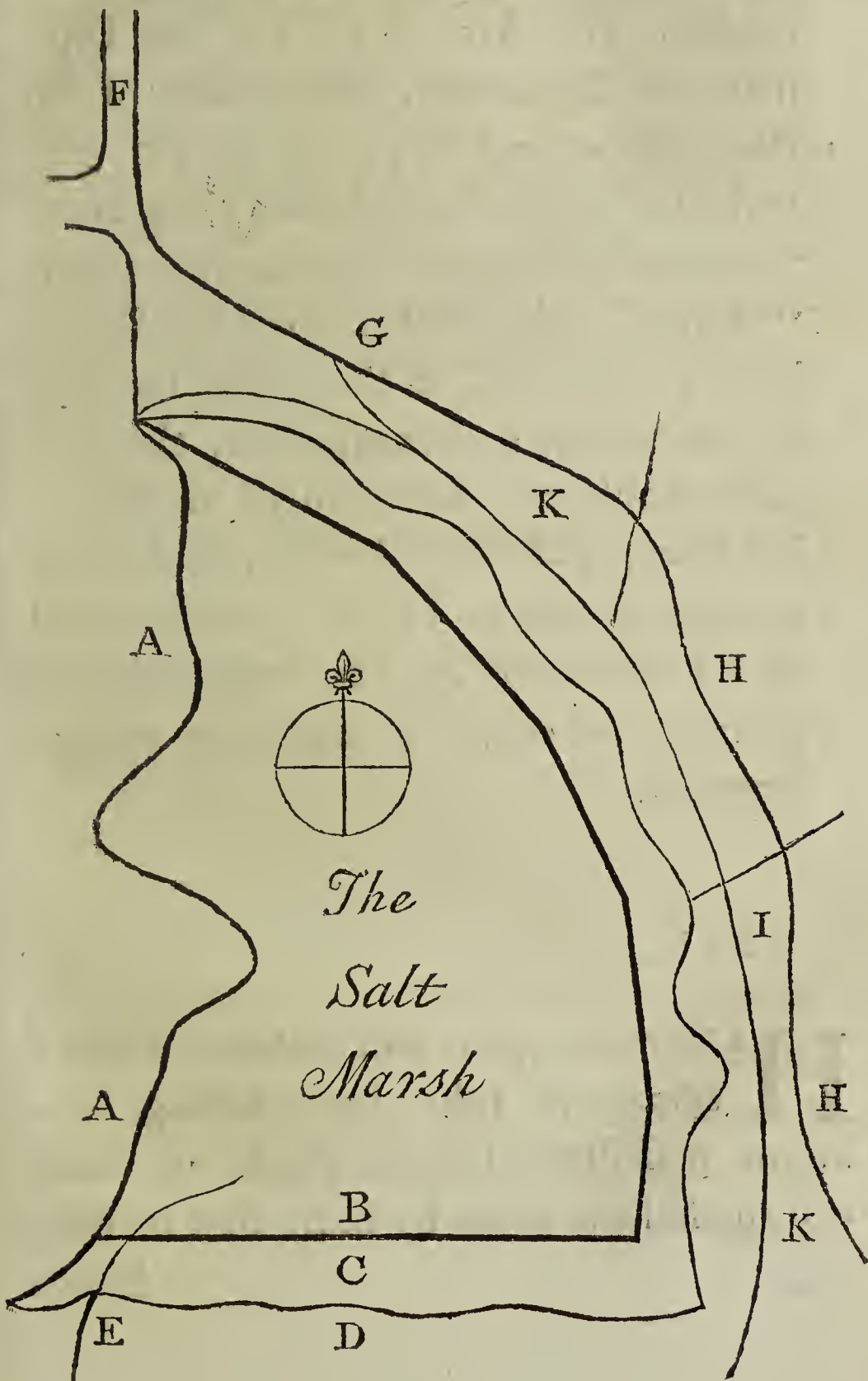
*Tolebury, near Malden,
Jan. 20th, 1790.*

MR. MORE.

-
- A. Old wall of my own estate.
 - B. The new wall.
 - C. Foreland left next the sea.
 - D. The boundary of the Saltings.
 - E. Inlet.
 - F. Goldhanger-street.
 - G. Wall of Mr. Pigott's estate.
 - H. Wall of Mr. Key's estate.
 - I. The tide might have been stopped here, if permitted.
 - K. Goldhanger creek.

Sketch

Sketch of a SALT-MARSH enclosed at Goldhanger, in the County of Essex, by Thomas Lee, 1789.



The Society this year received the following Papers from Mr. LANE, of Farringdon, and Mr. MANLEY, of Topsham, in Devonshire, sent in claim of the Premium offered “ To the person who
“ should have in his possession the greatest
“ number of stocks of Bees, not fewer than
“ thirty.” But neither of the Candidates having conformed to the terms specified in the Society’s advertisement, the premium could not be adjudged to them; but a bounty of FIVE GUINEAS was voted to each of them, for the laudable zeal they have shewn by their endeavours to promote an object so deserving encouragement.

S I R,

HEREWITH you will receive a Certificate of John Lane having now in his possession eighteen stocks of Bees, and an affidavit made by him, that he had,
before

before he began to burn them and take the honey, twenty-five stocks. You will also receive his account of the management of them. The man is very attentive and careful of them; and, as far as I am a judge, understands the treatment of them thoroughly. Of this I am certain, from all the intelligence I can pick up, that he has preserved his Bees, through the whole of this dreadful summer, much better than any person in this county.

I am,

Your obedient humble servant,

JOHN B. CHOLWICH.

*Farringdon-House,
Oct. 13th, 1790.*

MR. MORE.

Devon, to wit,

JOHN LANE, in the parish of Farringdon, in the said county, carpenter, maketh oath, and faith, that in the beginning of the month of September last he had in his possession twenty-five stocks of Bees, being

his own property ; and that he had them during the whole of the preceding summer. He further saith, that about three weeks since he burnt three of the stocks, and took the honey from them ; and that the Bees have deserted four of the other stocks : so that the number he now has in his possession is lessened to eighteen.

(Signed)

JOHN LANE.

Sworn before me,
One of his Majesty's Justices of
the Peace for the said county,
this 11th day of Oct. 1789,

JOHN B. CHOLWICH.

WE, the Minister and Churchwardens of the parish of Farringdon, do certify, That we know the above John Lane, and that we do believe the contents of the above affidavit to be true ; and that he hath now eighteen stocks of Bees in his possession.

E. SPARKS, Minister.

J. B. CHOLWICH, Churchwarden.

I, JOHN

I JOHN LANE, carpenter, have been a keeper and manager of Bees upwards of twenty years, and have had good success. I provide for their maintenance as much of such things as I see they labour and delight in. My little spot of ground is well stored with fruit-trees, such as plums, pears, and apples, and also with early honeysuckles. They delight much in the blossoms of beans and rosemary; for which reason I keep as much of those plants, as my little spot of ground will admit. I plant lilies before their houses, and having within these few years observed they delight much in the blossom of leeks, I keep a great many for their use.

For the management of them till the year 1787, I let them stand on good stakes and boards; in which manner I had great increase: for in 1787, one stock increased itself to six stocks of Bees; the old stock
 swarmed

swarmed twice; the first swarm swarmed twice; the second swarm, once: but that year some ill-disposed people stole four stocks of Bees from me in one night. Since that time I have therefore erected three houses; in which I can enclose, and keep under locks, thirty stocks of Bees. My front rank stands about fourteen feet from the turnpike road; the hinder rank, about twenty-one feet from the road. In the summer of 1788 my little winged treasure did over and above fill my houses; for I had thirty-three stocks of Bees.

When they swarm, I carefully provide for them reed butts or hives of a good size, holding about three pecks of corn; for they do not thrive well, when they have not good room to work and breed in: when they have good room, they generally cast large swarms. I have two in my garden of this year's swarming, that I was obliged to raise on liforms nine inches high, that they might have room to work; for they filled the hive down
to

to the brim, and beyond. I keep a register of their age; for I never take the honey from a hive of Bees under two years old: for the honey is richer and solider, and will keep better; for I have kept honey three years, and as sweet at last as it was at first.

This year, 1789, in September, I had twenty-five stocks of Bees, all my own property: but the spring and summer, this year, have been very bad for them. I have been informed, that in many different places the Bees are almost all dead, and very few have swarmed; for the weather has been so wet, that the very few that are alive, are very badly supplied with food. Some have applied to me to know how to preserve them, for they fear they will not live; and I have given them an account, that when I have a late swarm, or a light old stock, I take them into my infirmary, or feeding-house, where they cannot get out, nor any others come to them. I then take honey, or, if honey be scarce, coarse sugar will do very well,
 mixed

mixed up with middle beer; it must not be too thick: then take a piece of clean old comb; lay it flat on a plate, and spread the comb all over, till the holes are filled with the honey, or fugar prepared as above mentioned: then raise the hive, and shut the plate in, under it, and the mixture will soon be all carried up into the cells. And so I continue to feed them, till they are brought to such a state as I think proper.

I cannot hold with robbing them; and I have an account from Dr. Salter, a man of good ability, who says he cannot find a better way to preserve his stock, than by stifling with brimstone such stocks as he intends to take the honey from: for very often, and for the most part, the greedy robber takes so much from them, that they must starve; which is more cruel than a speedy death: or else the greedy robber must return back with shame what he so greedily took from them, or lose his stock. And I think there are more stocks of Bees
lost

lost by robbing them, than by killing them; but if they should happen to live, they are very weak in the spring.

For my own part, I observe to keep them dry and clean, and provide every thing I see necessary for them, and endeavour to do them all the charitable acts I possibly can.

If I should be thought, by the Gentlemen of the London Society, to be worthy their notice, I shall be truly humble and thankful.

I am

Your dutiful and humble servant,

and faithful friend to Bees,

JOHN LANE.

Farringdon,
Oct. 19th, 1789.

To the Society for Encouragement of Arts, &c.

THIS

THIS is to certify, That I, SIMON MANLEY, of Topsham, in the county of Devon, Plaisterer and Tyler, have in my possession twenty-one stocks of Bees, and that they have been in my possession during the preceding summer.

The manner of my treating them, and the place I keep them in, are as follow. They are kept in a garden, fifty-six feet by twenty-four feet; and in the garden are different sorts of herbs and flowers, situated about thirty yards from a salt-water river. Twice a year I lift the hives, and clean them out with a goose's wing, or a brush (I mean the stands); and in the summer time I stop the holes with a piece of lead, full of small holes, leaving one large enough for a single Bee to go in and out, the remainder being to give them air; and the Bees that guard the door, prevent the wasps and other vermin (which are plenty in that season) from

from entering. In the winter time, for fear the hard weather should hurt them, I carry them up to a room, which I keep for that purpose; and when there, put a tobacco-pipe in the large hole to prevent their coming out; and, if necessary, in the garden, and feed them that want it; my method of doing which is this: In the latter end of September, or beginning of October, I take about six pounds of honey to one quart of water, and dissolve it over a slow fire; then let it cool, and pour it out into a large pewter dish, and cover it over with writing-paper, and with a large pin prick it full of small holes. The paper swims upon the honey. I then put the pewter dish upon a stand, where the Bees are: afterwards I get a smooth board, with which I cover over the pewter dish: in the board I make a square hole, of about six or eight inches, for the Bees to go down: I then take the hive that wants feeding, and put it upon the board under which the dish is, and stop the hole with a tobacco-pipe, that the other Bees may not go in,

and disturb them. The next day I examine them, to see whether they have carried it up into their cells; which in general they do, leaving but very little, and sometimes none. After that, I take the dish away, and put them on their stands; and if they want it again, I do the same in March or April.

My method of taking the honey is thus: I never destroy the old stock of Bees; but, after lifting them to examine what honey there is, if I think the hive is full, I put another under that hive with a flat top; and in the middle of the top, a square hole. I take an opportunity, when the Bees are down from the top hive, to run a shutter, which is of wood, into the hole at the top; and that prevents them from going into the top hive; and then I take the top hive, and put it in a bucket, top under, or bottom upwards; and then take a little rod, and strike the butt or hive, till I think they are all out; and then they go home to the under hive which I left.

We,

We, the Minister and Churchwardens of the parish of Topsham, in the county of Devon, do hereby certify, That the above account is true, to the best of our knowledge and belief.

(Signed)

JOHN CARRINTON, Minister.

JOHN HILL,

LEWIS BEXFORD, jun.

} Churchwardens.

SAMUEL CLARK, Overseer.

To the Gentlemen of the
Society for the Encou-
ragement of Arts, &c.

Topsham,
Oct. 15th, 1789.

SIR,

I HAD the honour of receiving your favour of the 17th inst. In answer I beg leave to inform the Committee of Agriculture, that I had, this season, twenty-four

K 3 butts;

butts ; and the reason they were diminished, being under the unavoidable necessity of attending my business : while wanting, they swarmed and flew away ; and I could not get any intelligence of them afterwards. I have many times had, for some years, from thirty to forty butts ; and have kept them from that quantity to twenty butts these forty years past.

For fear I have not sufficiently explained my management respecting the honey, I have got hives on purpose, some of them flat, and some round ; and when I do not wish to have them swarm, I put the flat hive under, with a round board on the top ; and in that board a square hole, with a slider : and in the same hive I have got a small door, with small hinges ; and inside, a glass ; and in the season I open the door, and look through the glass, to see whether the combs are down in the hive, and filled with honey ; and if they are, I shut the slider, and take off the top hive, and leave
the

the under one for the stock (so that I lose none, except by the severity of the winter): and many times, after taking off the first, and leaving the under, I put another which likewise I have often had filled, and then I take off the top one again. The time I generally take them off, is the latter end of June, or beginning of July, and at any time of the day.

My method of doing it is: I carry it into my court, and set it on a bucket, with the crown or top downwards, and take another empty hive, and put on it, for fear the Queen Bee should be in it; and then with a stick I strike the under hive, till the Bees are all gone up into the empty butt, and carry them into my garden, nigh the hive I took them from; and they soon return to their old habitation: so that I never destroy my Bees.

I have not taken any honey this season, owing to the lateness of the spring, and the

continual rainy weather we have had. I dare say I might have done it ; but did not, for fear I should lose the hives of Bees.

I think few are more particular about them than myself. I have before now taken the Queen Bee, while they were in the act of swarming, put her in a clear bottle, and kept her from the swarm a full hour, and carried and shewn her to several gentlemen ; and the swarm continuing hovering about the garden, and not settled the whole time. When I brought her home, I have laid her on a floor in a kitchen window ; and being moist by her own breath in the bottle, when I took her out she licked herself clean ; and being quite recovered, I carried her out upon the hive where she swarmed from : a little time afterwards, about a handful of her subjects found her out, and seemed much rejoiced at finding her. From thence she arose up, and pitched on a currant-bush ; and the remaining part of the swarm came to her,
and

and settled at once ; and I hived them very well.

Being but a poor man, I hope the Gentlemen will take my claim into consideration ; and am,

SIR,

Your very humble servant,

SIMON MANLEY.

Topsham,
Nov. 22d, 1789:

Mr. MORE.

P A P E R

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C H E M I S T R Y.

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C H E M I S T R Y.

The Society this year received the following Letters from the Rev. WILLIAM MASON, of Aston near Rotheram, giving an account of a method of generating Yeast. To ascertain this curious fact, experiments were made, as hereafter mentioned: which fully succeeding, Thanks were given to Mr. MASON for the communication, and a bounty of Twenty Pounds to his servant JOSEPH SENYOR, to whom the discovery was first owing.

S I R,

LAST spring I requested a friend to inquire of you some particulars concerning the premium which the Society had offered on the production of Yeast, of which you obligingly gave him full information.

As I found November was the month in which the matter was to be decided, I deferred troubling you any more till I had caused an experiment to be repeatedly tried; which a domestic of mine, who brews for me, had at that time first made.

I had just before, with his assistance, impregnated wort with fixed air, or rather a decoction of malt in water, according to Dr. Henry's ingenious method, mentioned in the Memoirs of the Philosophical Society of Manchester, and by the Yeast thereby obtained produced good bread. This led him, unknown to me, to try whether the experiment would not succeed full as well without fixed air; which he found it did. He accordingly brought me a small vessel with a full head of Yeast upon it, assuring me with some degree of exultation, that neither oil of vitriol with chalk, nor any portion of old Yeast, had been employed on the occasion. This greatly surprised me; and I then desired he would proceed with the experiment in his own way,

way, and endeavour to increase the quantity already made, by what additional decoction of malt and water he might think proper; insisting only that nothing but malt, water, and heat, should be employed for the purpose. He did so, and in a few days increased the original quantity till it became sufficient to work a hogshead of small-beer, which produced ten pounds weight of perfect Yeast; and this, being soon after put on a vat for a hogshead of ale, was found to be augmented to forty-two pounds.

The discovery therefore is simply this:
“ that Yeast is not (as has, I believe, been
“ hitherto thought) some peculiar and
“ unknown substance, necessary to be added
“ to wort in order to put it into a fermenting
“ state; but that malt boiled in water will
“ generate it (as the chemists say) *per se*,
“ if the following circumstances be attended
“ to.

“ 1st, That the process be begun with a
“ small quantity of the decoction.

“ 2dly,

“ 2dly, That it be kept in an equal degree
“ of heat. And,

“ 3dly, That, when the fermentation is
“ begun, it should be assisted and augmented
“ with fresh decoctions of the same liquor.”

The proportions and method which my servant has found generally to succeed, I will now give you, as taken from his own words, in the form of a recipe.

Procure three earthen or wooden vessels of different sizes and apertures, one capable of holding two quarts, the other three or four, and the third five or six : boil a quarter of a peck of malt for about eight or ten minutes in three pints of water ; and when a quart is poured off from the grains, let it stand in a cool place, till not quite cold, but retaining that degree of heat which the brewers usually find to be proper when they begin to work their liquor. Then remove the vessel into some warm situation near a fire, where the thermometer stands

stands between 70 and 80 degrees (Fahrenheit), and there let it remain till the fermentation begins; which will be plainly perceived within thirty hours; add then two quarts more of a like decoction of malt, when cool, as the first was; and mix the whole in the larger-sized vessel, and stir it well in, which must be repeated in the usual way, as it rises in a common vat: then add a still greater quantity of the same decoction, to be worked in the largest vessel, which will produce Yeast enough for a brewing of forty gallons.

As I cannot conveniently send my servant to town on this occasion to produce the Yeast himself, and have also some doubt whether the simplicity of the process will not make it disregarded, I have thought it best to communicate the discovery previously to you, who, as my friend told me, appeared to be interested in its success; hoping you may be induced to try so easy an experiment, and to acquaint me with

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the result of it, before you communicate it to the Society. With my brewer it has never failed, except when the failure was to be accounted for from an inequality of temperature of the air, where the experiments were made: it seems therefore to me, that in the hands of a good practical brewer, accommodated with a place where his little vat will stand in a constant degree of proper heat, it will generally succeed, especially in the brewing seasons.

I am, SIR,

Your obliged humble servant,

WILLIAM MASON,

York,
Oct. 14th, 1789.

Mr. MORE.

P. S. It may be proper to add that my servant is of opinion, that a proper quantity of hops boiled in the liquor makes the fermentation proceed better; but as it may, and has actually succeeded without such addition,

addition, I would willingly wish them to be omitted, to prevent the bread baked with it from tasting bitter. Experience only can decide this; and farther experience is still wanted, to make a perfect recipe for the operation.

SIR,

I MEANT my former letter as a private one to you, merely to induce you to make the simple experiment therein mentioned; however, as you think it contains a discovery of sufficient consequence to be communicated to the Society, I have no objection to your doing it. They will have before them a plain fact, which may be expressed in one short definition; that
“ Yeast, used for the purposes of brewing
“ malt liquor, and in making bread, is a
“ viscid frothy substance, which arises on
“ the surface of a simple decoction of malt
“ in water, when in a state of fermentation;

L 2

“ and

“ and which substance, after it has been
“ so generated, may, by additional quan-
“ tities of the same liquor gradually sup-
“ plied, be increased *ad infinitum*.” This
definition, duly attended to, will put the
Committee on their guard in adjudging the
premium to any person who, by adding
any known or unknown article to wort,
offers it as a substitute for old Yeast taken
from a former brewing, because they will
be taught that new original Yeast may be
obtained from wort itself without any such
substitute.

With respect to the doubt you expressed
in your obliging answer to my last, I can
with truth assure, that in all the primary
decoctions made hitherto for the purpose,
coarse earthen and *glazed* pots have been
used, till a quantity of Yeast sufficient to
work a brewing of beer was produced :
after which, the process was carried on in a
large wooden vat ; and therefore, when I
used in my last the epithet *wooden* as well as
earthen,

earthen, it was merely because I thought the former kind of vessels less liable to accidents.

Certain it is, that in two experiments lately made here in York, one by myself, the other by my friend Dr. Burgh, a gentleman much more conversant in chemical matters than myself, new earthen vessels bought out of the shops were employed.

He produced excellent bread from the Yeast which his decoction had generated, without any addition of hops: a small quantity of hops were boiled in mine; which, without much affecting the taste of the bread baked with it, left about four gallons of table beer, now in a small cask; which, though not fine, from having been brewed little more than a fortnight, is greatly preferable to the wretched bitter beverage sold by our common brewers, from whose vats a Yeast is produced, equally unpalatable for the purpose of baking, and perhaps equally unwholesome both for baking and brewing.

I am much obliged to you for the attention which you promise to pay to the experiment; but I cannot help wishing that you had at your elbow one of our old housewives in one of our obscure Yorkshire dales, used, as they are, to very small brewings, who, after two or three little blunders, would soon bring it to a certainty.

I am, SIR,

Your much-obliged, and

very obedient humble servant,

WILLIAM MASON.

York,
Oct. 24th, 1789.

Mr. MORE.

DEAR SIR,

I SHOULD have answered your obliging letter, which informed me that the experiment had succeeded before the Committee

mittee, had I not waited to give you an account of another which I was then making, in hopes of simplifying the process still farther.

This was by substituting a simple *infusion* of malt instead of a *decoction*, and draining the liquor through a sieve, instead of leaving it off gradually. Yeast was apparently generated by this means, and by the second additional infusion considerably increased; but when beat in, did not rise again. I consider this experiment therefore as abortive; yet I choose to mention it to you, as, by knowing what methods fail, as well as those which succeed, processes of this kind can only be brought to a certainty.

I have much satisfaction in learning that the Gentlemen of the Committee (to whom I beg my best compliments) have thought my servant deserving of the reward you mention. His name is Joseph Senyor, of

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Aston,

Aston, in the West Riding of Yorkshire. I hope however, before the time when the premiums are given, we may be able, by a repetition of experiments, to bring the matter to so great a degree of certainty, as to establish a rule or recipe for generating Yeast in the best manner: for hitherto we only know how it may be done, not how it may best be done; to promote which, I flatter myself, you, Sir, will contribute your assistance, and continue the correspondence which you have so obligingly carried on with me on the subject.

I am, SIR, with great esteem,

Your most obedient servant,

WILLIAM MASON.

Nunham,
Dec. 16th, 1789.

Mr. MORE.

DEAR

DEAR SIR,

ACCORDING to my promise, I write to inform you of the result of some more experiments which have been made here, under my direction, relative to Yeast; and the rather, because they were made by means of a very simple apparatus, which I think will be found very convenient on ship-board, and also in cottages, &c. It is merely a wooden box, of about twelve or fourteen inches square, open on one side, in which a vessel containing the wort is placed; and then the box is set with the open side close to a wall, heated by a fire on the other side, when the thermometer indicates the wall to be about 80° : so that I imagine the back of a chimney in a ship, or behind an oven or kitchen-fire in a cottage, would be found very convenient for the process; as the vessel might be there surrounded with a small atmosphere of air, sufficiently warm

at the first, and capable of being continued at the same equable temperature for a sufficient time.

A box of this kind, in which the following experiments were made, was placed on a dresser in my kitchen, more than eighteen feet from the kitchen-fire, but against a thin wall, which divides the kitchen from the servants hall, just behind the fire-place of that room; and the open side of the box turned to the heated wall, the vessels themselves uncovered. If you recollect the trouble you so obligingly took in heating your office, you will think this method, since discovered, of performing the same experiment, of considerable utility.

Experiment 1st.—Three vessels were set at the same time in the warm box, containing a quart of liquor each, and of equal strength with respect to malt; one was a decoction without hops, another with hops, the other a simple infusion of malt: in about
twenty

twenty-four hours the hopped decoction produced a fine head of Yeast; the other decoction fermented as well, but was twenty-four hours later; the simple infusion was near thirty-six hours later, and the Yeast appeared dark and ill-coloured, so that my housekeeper thought it spoiled; but this bad appearance was merely owing to its not having been boiled and cleared, for it made very light breakfast rolls.

This experiment, you will perceive, was made to try whether hops (as my servant imagined) were necessary; and it certainly proves that they accelerate the fermentation; but it proves also, that neither hops nor boiling are essential to the process.

Experiment 2d.—Four vessels from a common brewing of ale were placed in a box of longer dimensions; one contained two quarts; a second, one; a third, a pint; a fourth, half a pint: they all shewed signs of fermentation at the same time, viz. in
about

about twenty-four hours ; but that in the mug or pot holding a pint appeared the strongest, which my servant thought was owing to the smaller diameter of the vessel, which was smaller in proportion to the half-pint ; but as it stood more centrally to the heat of the fire behind, I am persuaded the excess of fermentation proceeded from that cause. This proves that the quantity you begin the process with is not very material : though two quarts seem to be most convenient for the purpose of baking.

Experiment 3d was instituted merely to find whether an addition of sugar would accelerate the fermentation ; for which purpose, two quarts of hopped liquor were tried in separate vessels, a quart in each : and the result was, that the decoction, in which two large spoonfuls of coarse sugar were stirred in, did not ferment in the least, though continued in the warm box five days and nights ; the other fermented in about thirty-six hours. The reason of this later fermentation

mentation than of that in the former experiments, was, that the liquor used was from a brewing of small-beer. Hence we may conclude, that a decoction of the strength of ale, if not of strong beer, is the best to begin with.

I cannot myself think of any other experiments that may tend to elucidate the matter further; but if you please to propose any, I can with much ease make them, especially at this brewing season (though these I have already made are of a month's standing), and shall with great pleasure send you the result. Believe me to be, with true esteem,

Dear SIR,

Your faithful and obedient servant,

WILLIAM MASON.

*Aston, near Rotheram,
March 20th, 1790.*

ACCOUNT

ACCOUNT of Experiments on the GENERATION of YEAST, made under the Inspection of the Committee of Chemistry, in the month of November, 1789.

FOUR quarts of ground malt were put into a new stone ware vessel, and mashed with about an equal quantity of hot water in the usual manner for brewing. When the mash had stood about an hour, the wort was drawn off, and three quarts of boiling water poured on the grains: when this had stood a due time, the liquor was suffered to run off, and the whole liquor boiled half an hour; being then set to cool, was poured clear from the sediment, and then put in a room where the heat was regularly kept up to summer heat, or near 80° of Fahrenheit's thermometer. It stood in this degree of heat till some signs of fermentation appeared on the surface; which came on in about three days.

Another brewing was then made as above described; and, when of a due heat, stirred
into

into the former liquor. In about twenty-four hours some Yeast appeared, and another brewing was then made; and, when of a due heat, mixed with the two former ones, and well beat in, the heat being still kept up to the degree above mentioned: in about two days more, five ounces of excellent Yeast were collected from the surface of the liquor.

Some of this Yeast being mixed with a due proportion of flour, water, and salt, answered all the purposes intended for bread; and might certainly have been equally well applied to brewing, in the common method. In fine, being pure and good Yeast, it will answer all the intentions of that useful article.

P A P E R

I N

M A N U F A C T U R E S.

M

M A N U F A C T U R E S.

THE promoting the growth of Silk-worms, and producing Silk in England, has long been an object of the Society's attention ; and several rewards bestowed, in hopes that, in time, that valuable insect might be naturalized to this climate ; and a new branch of Manufacture, and in consequence a new employment for women and children, found in this country. From the Papers of Mrs. WILLIAMS, Miss RHODES, and the Rev. Mr. SWAYNE, printed in the preceding Volumes of these Transactions, little doubts remained of the practicability of breeding and rearing those insects in England. And this year such indisputable proofs were given to the Society, by the production of five pounds weight of excellent Silk, and a number of the cocoons (which, in the judgment

of every one who has examined them, are in general larger, heavier, and of a superior quality to any seen before, and the Silk as good as can be produced in any country whatever), that it should now seem nothing is wanting to the establishment of this long-wished-for business, but the planting mulberry-trees for the food of the Worms: and this, there is reason to hope, will be accomplished, several Gentlemen in the South-West parts of England proposing to make the trial on a large scale. Samples of the Silk, and some of the cocoons, are reserved in the Society's collection; and it appeared in evidence to the Committee, to whose consideration this business was referred, that Silk can be advantageously produced in England: and it was the opinion of the claimant this year (Mr. Salvatore Bertezen), that this climate is better adapted to the breeding Silk-worms than Italy itself; for he believes the great heats of Italy are much more detrimental

detrimental to the Worms than any fogs or moisture of this country. The five pounds of Silk, which was the quantity required to be produced, was obtained from twelve thousand Worms ; and each thread, when wound, consisted of seven or nine fibres. Many Certificates having been produced, corroborating the above, the GOLD MEDAL was adjudged to Mr. SALVATORE BERTEZEN, for Silk produced in England.

Mr. Bertezen, at the time of rearing these worms, lived in Kennington-lane, Surrey, where the Silk was wound off.

IT is evident that the improvement of the Loom must be an object of the most serious attention to a Society formed in a particular manner to promote the Manufactures of these kingdoms : and the following Letter from Mr. SHOLL, with a complete model of his new constructed Loom (of which a plate is annexed, the model remaining in the Society's repository for the use of the public), having been received, the SILVER MEDAL and THIRTY GUINEAS were given him as a bounty ; it appearing from the evidence of several Gentlemen conversant in that branch of silk-weaving to which this loom is particularly adapted, that the advantages of this construction are, the gaining light, a power of shortening the porry occasionally, so as to suit any kind of work, being more portable, and having the gibbet firmly fixed, together with the diminution of price ;
 which,

which, compared with the old loom, is as five pounds, the price of a loom on the old construction, to three pounds ten shillings, the price of one of those contrived by Mr. Sholl; and that, as the proportion of light work is to strong work, as nine to one, this sort of loom promises to be of very considerable advantage, particularly in making modes, or other black work.

S I R,

HAVING been employed more than twelve years past in the weaving of Silk, I have had occasion to observe several considerable inconveniences to which this manufacture is subject. To the removal of these, my attention has been for a long while directed; and I have at length succeeded in the construction of a model, which is entirely new; and the utility of which, I now beg leave, Sir, humbly to sub-

mit to the critical examination of the Society for Encouragement of Arts, Manufactures, and Commerce.

The several advantages of this invention are as follow.

1st. It is not liable to unsquare ; and yet, on any necessary occasion, may be more easily removed than the old loom.

2d. In the construction of it, more than thirty feet of wood are saved.

3d. It is much sooner removed in case of fire, or any other sudden occurrence.

4th. It has a very great advantage, with respect to admitting light to the workmen.

5th. In case of removal, it may be carried up some stairs which the old loom cannot pass.

6th. If room should be wanted for any temporary purpose, the work may be laid aside without injury.

7th.

7th. It may be set up in sloping garrets which will not admit of the old loom.

8th. As the cane-roll posts are fixed to the floor by screws, the porry may be made of any length, by only screwing the cane-roll posts nearer or further from the breast-roll.

9th. The gibbet is formed in the loom ; and therefore the trouble of fixing it is prevented.

10th. There is an advantage in the bridge of the battons, which was formerly nailed to the block ; but in this loom iron pins are put in the block, and partly go through the bridge, fastened with glue, so that the Silk cannot be injured, as used often to be the case.

11th. The battons rise, as the work rises, and keep more true.

12th. The manner of setting to the work obviates inconveniences, and prevents the injury attending the workmen in old looms.

13th.

13th. As some landlords do not care to let their houses to weavers, on account of their breaking the walls, that inconvenience is also removed.

In order to render this improvement the more acceptable, it is so contrived as to preserve in use the most valuable part of the old materials; such as rolls, battons, counter-meshes, &c.

With a model less perfect than that I now offer, I have ascertained, by near two years experience, and on one of the nicest works in the trade, the advantages above recited; and to my employers I have given great satisfaction.

Hoping, Sir, that the model produced will meet the approbation of this most honourable Society, and prove a benefit to the weaving manufacture, I take the liberty of presenting it for their inspection. Their
 approbation

MANUFACTURES. 171

approbation and encouragement, as well as the prospect of public utility, will give great pleasure to,

SIR,

Your very humble servant,

SAMUEL SHOLL.

*New Turville-street, Bethnal-Green,
Sept. 15th, 1788.*

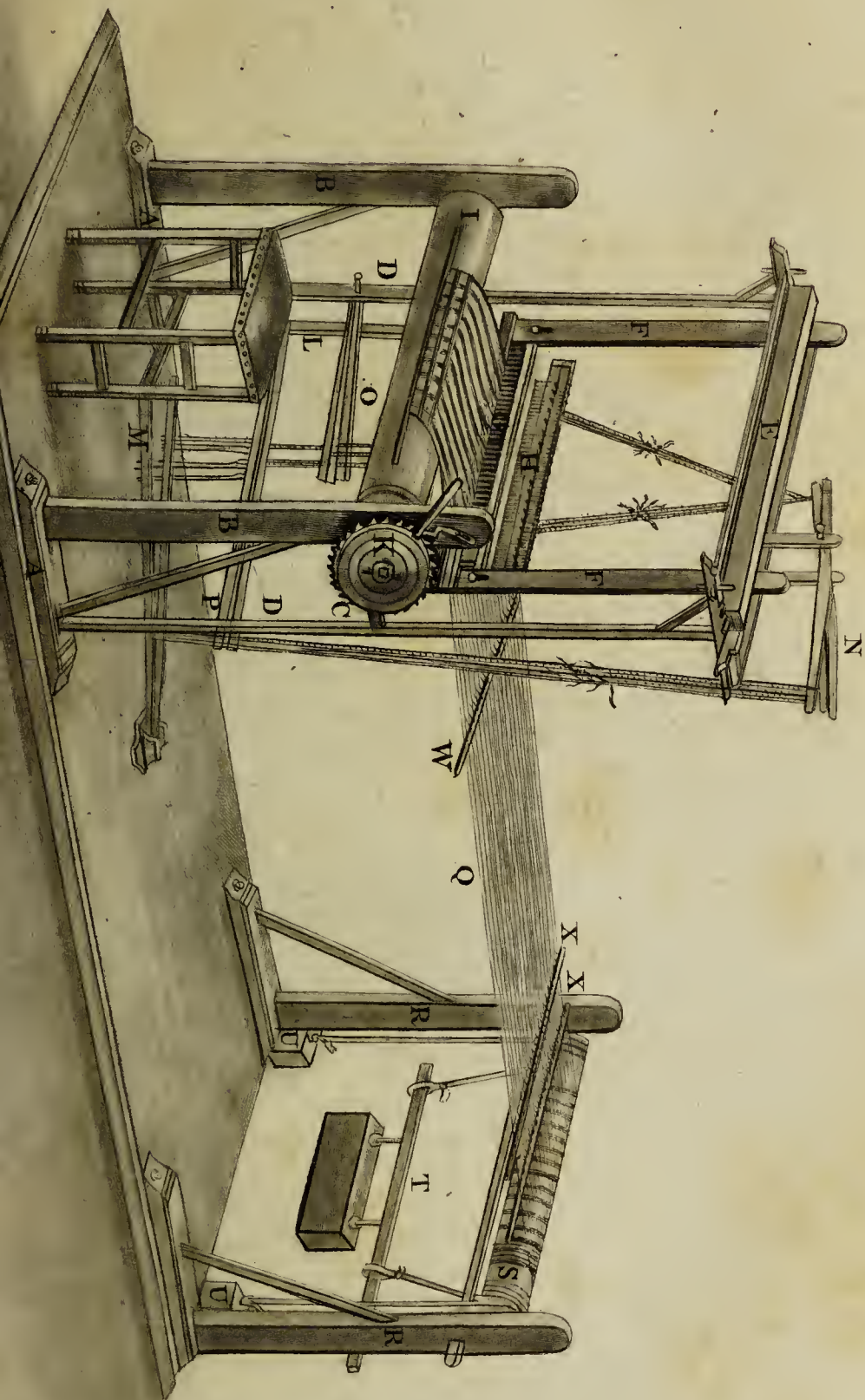
MR. MORE.

DESCRIPTION

DESCRIPTION of the Plate of Mr. SHOLL'S
improved LOOM for weaving *slight*
Silks.

- A. A. The Sills.
- B. B. The Breast-Roll Posts.
- C. The Cut Tree.
- D. D. The Uprights,
- E. The Burdown.
- F. The Batton.
- G. The Reeds.
- H. The Harness.
- I. The Breast-Roll.
- K. The Cheefe.
- L. The Gibbet.
- M. The Treddles.
- N. The Tumblers.
- O. Short Counter-meshes.
- P. Long Counter-meshes.
- Q. The Porry.
- R. R. Cane-Roll Posts.
- S. The Cane-Roll.
- T. The Weight Bar and Weight.
- U. U. Counter-weights.
- W. The Breaking Rod.
- X. X. Cross Rods.

W. A. Silk Loom improved by W. Sams & Sholl.





P A P E R S

I N

M E C H A N I C S.

THE UNIVERSITY

OF

THE STATE OF CALIFORNIA

M E C H A N I C K S.

The Thanks of the Society were given to Mr. JOHN ADAMS, of the Academy at Edmonton, for the following communication, respecting the subdivision of a Nonius invented by him.

PERMIT me, Gentlemen, to lay before you a subdivision of a Nonius, by means of which, the divisions of a quadrant, &c. twenty inches radius, may be read off to a second, or less; and the instrument rendered equal, if not superior, in many cases, to the mural Quadrant at Greenwich,

To elucidate this, let us suppose the limb of a quadrant divided in the common manner,

ner, each degree into parts of twenty minutes each; then the span or arch of nineteen of these divisions being laid upon the index, and divided into twenty equal parts, makes the Nonius; which will read off to a minute: the principle of which is too well known to need more to be said on that head: and the subdivision is equally easy to be understood, being upon the same principle. Therefore, let the span taken upon the index be one minute greater, or less than the nineteen divisions; then it will be evident, that in the former case (when it is one minute more), there will be as many times three seconds to be subtracted as the coincident division of the Nonius points out minutes to be added; and in the latter case, as many times three seconds are to be added.

Now, as an instrument, five inches radius, can be divided into half-minutes accurately, and be read off to quarter-minutes,

minutes, or less. One of twenty inches radius will give four times the scope; and may be divided so finely, that a coincidence must very often take place amongst the lines on the limb, and Nonius on the index: if not, the difference may be estimated to a very great nicety. Again, supposing each degree on the limb, or arch, to be divided into parts, of ten minutes each; then nineteen of those parts, more or less, twenty seconds being laid upon the Nonius, and divided into twenty parts, will again bisect, and make forty parts.

Such an instrument will, on a perfect coincidence, be read off to half a second.

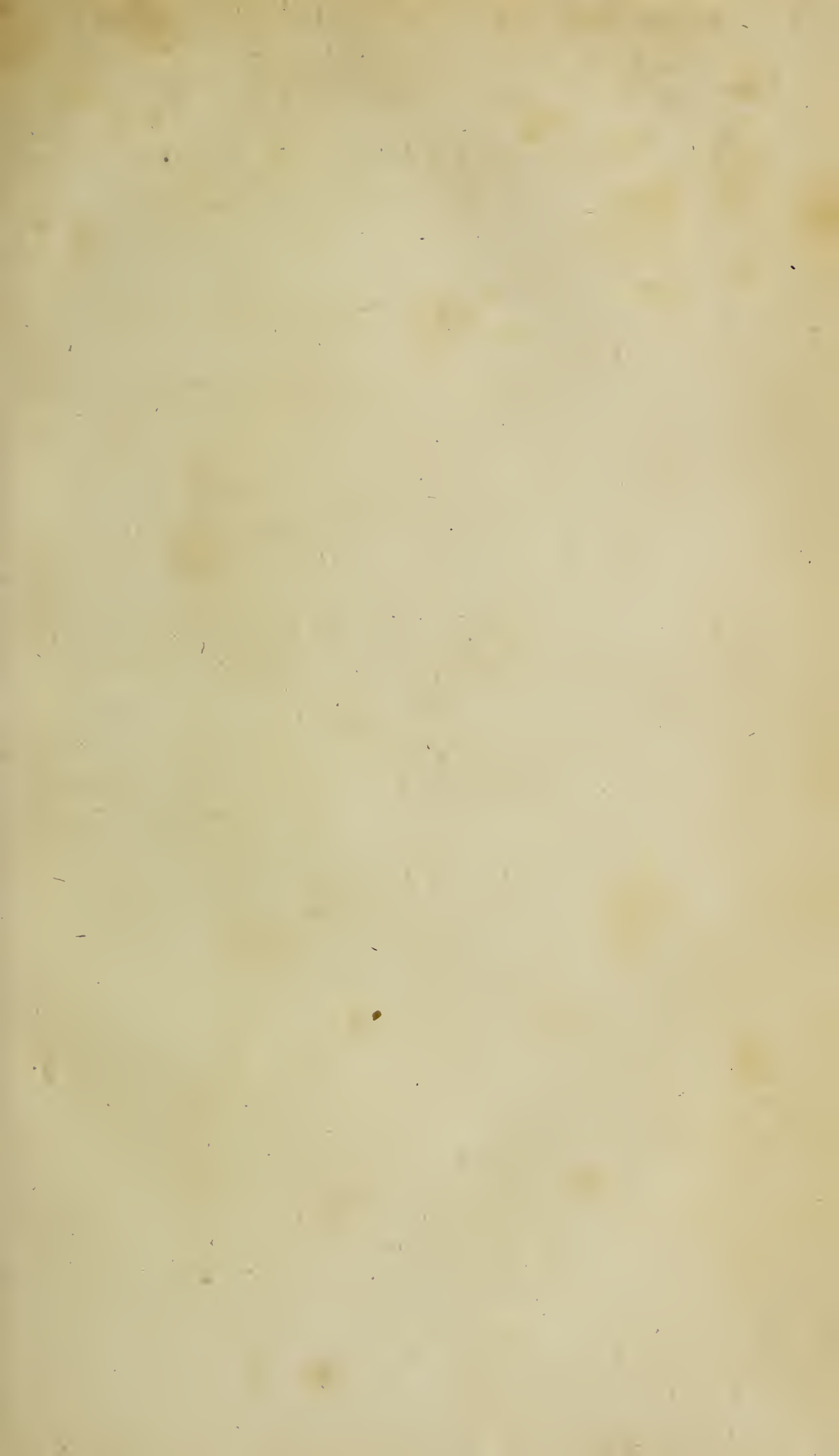
It often happens in instruments, that the Nonius, either over or under spans a small quantity; which, if discovered, and divided by the number of divisions on the Nonius, gives the quantity to be added or subtracted for each division, and proves a perfection in
 N a well-

a well-divided instrument. This accident gave rise to the idea, which has been fully verified by

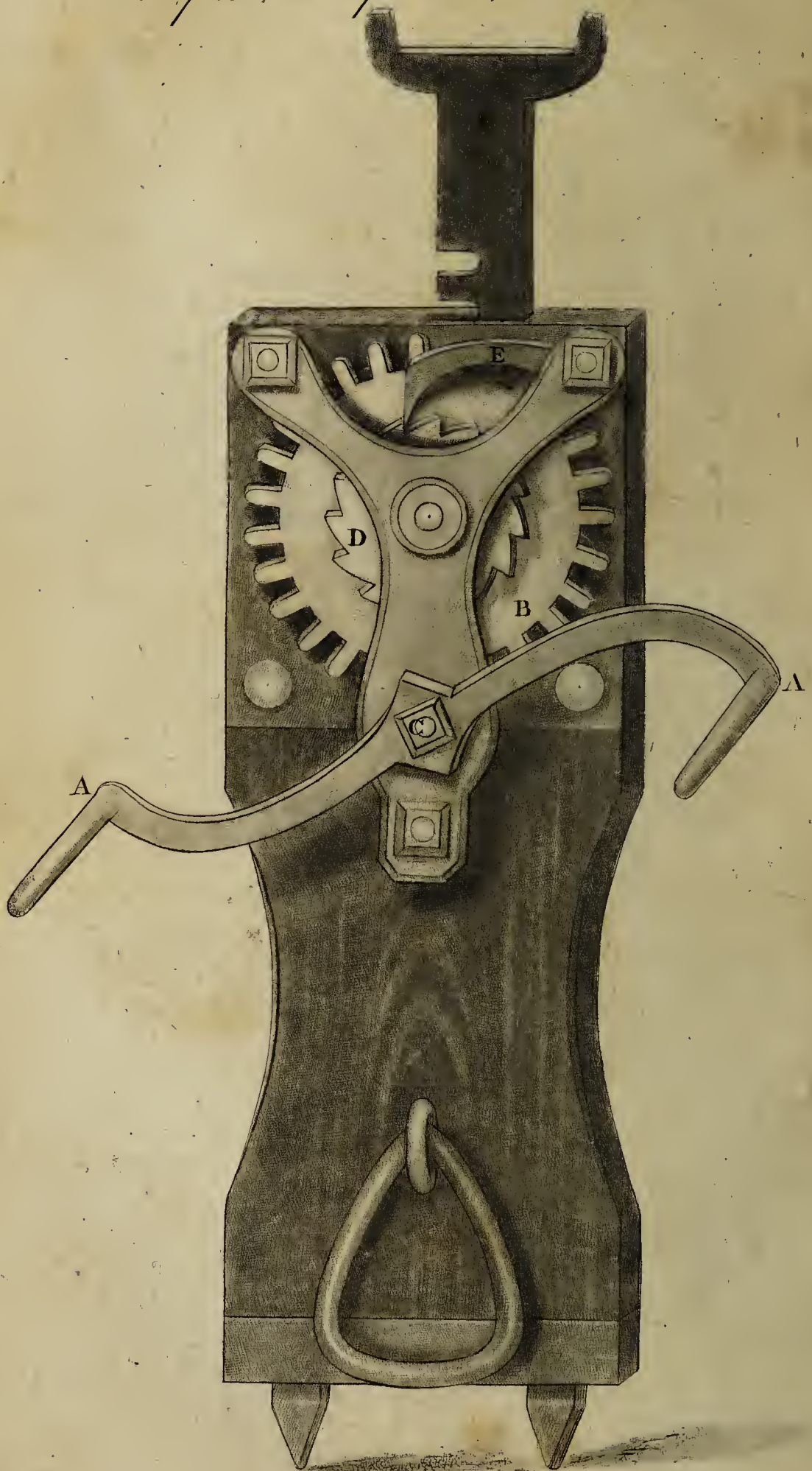
Your humble servant,

JOHN ADAMS.

To the Society for the Encouragement of Arts, Manufactures, and Commerce.



*A Jack for raising large weights,
improved by M^r Moccock.* Plate II.



THE accidents that frequently happen, in using the Jack for raising large weights, from the want of a contrivance to prevent the machine running back if the weight by any means overcomes the power, has long been observed; but no attempts seem to have been made to protect the workmen on that occasion. Mr. MOCOCK, of Southwark, having produced a Jack, with a Click and Ratchet, so contrived as to prevent that danger, the Society voted to him a bounty of TWENTY GUINEAS, he leaving a model with the Society for the use of the public.

On examining the annexed plate of Mr. MOCOCK's Jack, it will appear not to differ much, either in principle or construction, from those in common use; except that in this Jack a Pall, or Click and Ratchet, are applied in such manner as to hold the machine fast, if the weight

N 2 overcomes

overcomes the power, and thereby prevent any accident the workmen may be subject to, by the running down of the machine; by which the men are frequently exposed to danger, and often suffer, especially on board ships in engagements; when, from inattention or neglect in fixing the hooks, or from any other cause, the Jacks hitherto in use fail in the working.

Explanation of the Plate of Mr. Moccock's improved JACK FOR RAISING LARGE WEIGHTS.

- A. A. The double handles of the winch.
- B. The large-toothed wheel, in which the pinion on the axis (C) works.
- D. A ratchet-wheel.
- E. The click or pall, which, falling into the teeth of the ratchet, prevents the machine running back, if the weight overcomes the power.
- F. The rack, as in common jacks.

IT

IT is with particular satisfaction the Society observe the progress making in the use of the Gun-Harpoon, in the Whale Fishery; which, as it was first encouraged by them, has ever continued an object of their attention, and now promises to become annually of more general use. The following Certificates will further evince the utility of that contrivance; and as the Fish taken were shot at a distance at which it would have been utterly impossible to have secured them by the Hand-Harpoon, every one so taken may be considered as clear gain to the Nation.

The following Certificates having been received, the several Premiums, offered for Whales taken by means of the Gun-Harpoons, being THREE GUINEAS for each whale, were adjudged to the Harpooners under mentioned.

N 3

THIS

THIS is to certify, That JOHN DRYDEN, of the ship Arnold Polly, shot a large fish, the 29th of May, this present year, at the distance of about twelve or fourteen fathoms.

(Signed)

JAMES FRAZER,
Master.

Oct. 9th, 1789.

THIS is to certify, That THOMAS WILKINSON, Harpooner on board the ship Butterworth, shot a fish with the Gun-Harpoon, in Davis's Streights.

JOHN STEEL, Harpooner, on board the said ship, shot a fish on the same voyage.

MARSHALL SUMMERS, on board the said ship, shot a fish during the same voyage.

And

And JOHN WHELDON, Harpooner on board the said ship, shot two fish on the same voyage.

GENTLEMEN,

I TAKE the liberty to inform you, that I signed the foregoing Certificates for four Harpooners, who shot five fish last year in Davis's Streights, between the latitudes 70 and 72 north, on Baffin's London coast.

1789.—May 31st, THOMAS WILKINSON shot a fish at about nine fathoms distance.

June 3^d, JOHN STEEL shot a fish at about ten fathoms distance.

June 9th, MARSHALL SUMMERS shot a fish at about six fathoms distance.

May 22^d, JOHN WHELDON shot a fish at about eight fathoms distance. And

July 7th, JOHN WHELDON shot also another fish at about fourteen fathoms distance.

The above fish were all killed in a very short time, in consequence of the Gun-Harpoon going so far into the bodies of them.

I am, Gentlemen,

Your most obedient, humble servant,

WILLIAM BROWN,

Commander of the ship Butterworth.

To the Society for the Encouragement of Arts, &c.

S I R,

SIR,

I HAVE taken the liberty to request, that you will lay the following Certificates before the Society of which you are the Secretary; which will serve a very deserving man, in whose favour it is written, as well as oblige,

SIR,

Your very humble servant,

JOHN WHEATLEY.

*Stepney Causeway,
Nov. 29, 1789.*

Mr. MORE.

THIS is to certify, That GEORGE LESHLEY, a Harpooner, of the Britannia of London, under my command, did, in Davis's Streights, this last season, shoot two whales with the Gun-Harpoon; which I hope will entitle him to the premium

mium offered by the Society; and is the cause of my laying this account before them; the first on the 28th of May, 1789, in latitude about 71° north, at ten fathom distance. He fired, and shot about six feet into the body of the fish: it ran out two lines, and came up in about twenty minutes, blowing blood, and very much spent, and was killed by the other boats in a few minutes: when it was got along-side, we were obliged to heave a tackle to get the harpoon out again. Length of bone, ten feet nine inches.

The second was shot in latitude 71° , $34'$, by observation, on the 19th of June, 1789. He shot it, at twelve fathoms distance, in the rump: he had followed it near an hour, it being calm; and when he got within thirty or fifty fathom, the fish, disturbed by the noise of the oars, frequently went under water; but he followed it by its wake, till he shot it as above mentioned.

It

It ran out seven lines, and was killed in about two hours. Length of bone, ten feet one inch.

I am, Gentlemen,

Your most obedient, humble servant,

JOHN WHEATLEY.

To the Society for the Encouragement of Arts.

The Thanks of the Society were presented to Lieutenant-Colonel DANSEY for the following Letter, accompanied with a Drawing and Model of a Machine for draining Ponds without disturbing the mud ; of which a Plate and Description are here given, and the Model and Drawing remain in the Repository of the Society for the inspection and use of the Public.

S I R,

I FEEL myself much indebted to Owen Salusbury Brereton, Esq. V. P. of the Society for Encouragement of Arts, Manufactures, and Commerce, for the trouble he has had in producing to the Society the model of a Machine for draining Ponds without disturbing the mud ; which model I made from a description given me about
a twelve-

a twelvemonth ago by Coplestone Warre Bamfield, Esq. of Hestercombe near this place, of a machine he has had in use these fifteen years for supplying a cascade in his pleasure - grounds. Our regiment being quartered at Windsor, I thought the invention might be useful to supply the grand cascade at Virginia Water ; which induced me to make the model, and shew it to his Majesty. It met his gracious approbation ; and by his command Mr. Robinson ordered a penstock on that principle at one of the ponds in the neighbourhood ; which was constructed from that model, under the direction of Mr. Sandby.

Flattered by its having been so far approved, I shewed it to Mr. Salisbury Breton, and, on leaving Windsor, desired his patronage of it ; and promised, when I met Mr. Bamfield, we would fully explain its use and construction. The thought struck me, that it might be very useful in the hands of men of science, and applica-
ble

ble to filk, cotton, and other mills, where a steady and uniform velocity of water is wanted; which may be regulated at pleasure; and occasioning no current to disturb the mud or fish, the stream being constantly running from the surface.

I have frequently made the experiment by the model in a tub of water; which it is calculated to do. My wishes will be fully gratified, if, by my means, the invention becomes of public utility.

I am, SIR,

Your very humble servant,

WILLIAM DANSEY.

Taunton,
Dec. 30th, 1788.

Mr. MORE.

DESCRIPTION



Machine for draining Ponds without disturbing the Mud.

Fig. 1.

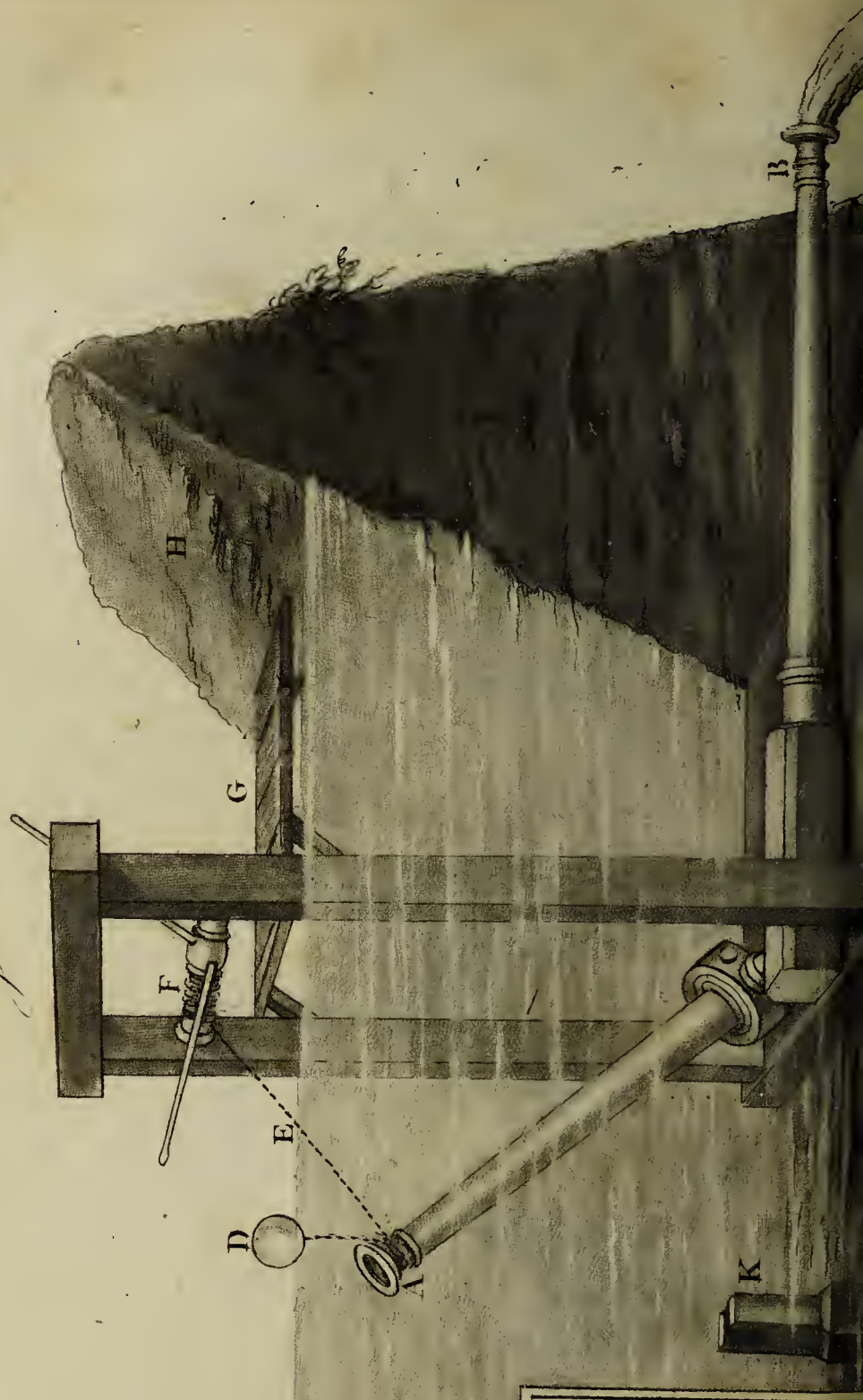


Fig. 2.



DESCRIPTION of the Plate of the
MACHINE FOR DRAINING
PONDS, &c. without disturbing the
Mud.

FIGURE I.

- A. The pipe, loaded with a rim of lead, of such weight as serves to sink it below the surface of the water.
- B. The discharging pipe, laid through the bank, H, I.
- C. The joint, on which the pipe, A, turns its form, shewn Fig. 2.
- D. The ball or float; which, swimming on the surface of the pond, prevents the pipe, A, descending deeper than the length of the chain by which they are connected.
- E. A chain winding on the windlafs, F; and serving to raise the tube, A, above the surface of the water, when the machinery is not in use.

G.

G. A stage.

H, I. The bank, represented as if cut through at I, to shew the tube, B, lying within it.

K. A post to receive the tube, A, when lowered, and prevent its sinking in the mud.

FIGURE II.

A. A cast cylinder, with a plate or cheek, B, which is fastened to the timber of the tube on one side, but not on the other, as the part of the cylinder, C, turns in the hollow of the wooden tube, when it is immersed. A piece of strong sole leather is put inside the brass plate, B, to prevent leaking.

IN the year 1781 a SILVER MEDAL was voted by the Society to Mr. MATTHEW QUIN for his improvements of the Hydrometer. (See Vol. II. of these Transactions.) And this year Mr. Quin having produced an instrument still more perfect, (see the annexed Plate), the Society voted him, as a further bounty, a SILVER MEDAL and TWENTY GUINEAS. It is now believed that little more is wanting to the perfecting the Hydrometer, as a useful and practical instrument for distillers, brewers, and chemists; Mr. Quin having so simplified it, that with *four* weights only, the strength of spirits, and also of worts, may be readily and commodiously ascertained by it, to as great a degree of precision as is required in business. Various have been the attempts to render the Hydrometer perfect; as it is known that an instrument which would with ease determine the compara-

O

tive

tive strength of spirits, would prevent those continual disputes that arise between the officers of government and dealers in spirits. Many ingenious contrivances have been brought forward for that purpose ; but the inventors of them have thrown the business into great confusion, by the necessity they have imagined there was for increasing the number of weights to a very great degree ; and even adapting separate weights and instruments to determine the strength of spirits, or the gravity of worts. The lessening the number of such weights will appear a matter of great importance to those who are acquainted with the manner in which such large works as breweries and distilleries are necessarily carried on ; and as it appeared by various trials, made with as much care as possible, that the Hydrometer produced by Mr. Quin was full as accurate as any tried at the same time, both in spirit and wort, Mr. Quin's instrument answering both purposes.

It is now hoped the instrument is brought to such simplicity in its construction, and such facility in its use, as may fully answer the intention both of the officers of government, and the public at large.

*To the Society for the Encouragement of Arts,
Manufactures, and Commerce,*

*The humble Memorial of MATTHEW QUIN,
Balls-pond, near Newington-green,*

SHEWETH,

THAT in consequence of the many complaints, which were made some years ago by the distillers, and dealers in spirits, of the great inaccuracy and numerous defects of Clarke's Hydrometer, your Memorialist was induced to make Hydrometers on an improved plan; for which he was honoured with the Silver Medal of the Society in the year 1781.

That the imperfections complained of were clearly proved in the Court of Exchequer ; and Government found it expedient to have accurate instruments ; but introduced a clause last session (in the expiring law-bill) to legalize Clarke's Hydrometers for twelve months, in order that proper experiments might be made.

That your Memorialist begs leave to state, that he has completed a new and universal Hydrometer ; whereby the real strength of any spirit, from alcohol to water, may be ascertained in the most plain and expeditious manner ; and points out the concentration of each strength ; also discovers the gravity of worts ; and estimates the comparative value of malt, &c. with four weights only.

That your Memorialist, having heard that the Royal Society have been trying experiments, humbly prays, that the Society for Encouragement of Arts, Manufactures, and Commerce, will be pleased to examine
the

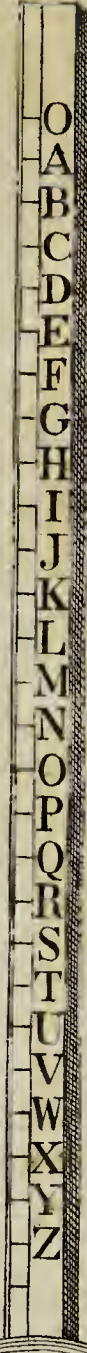
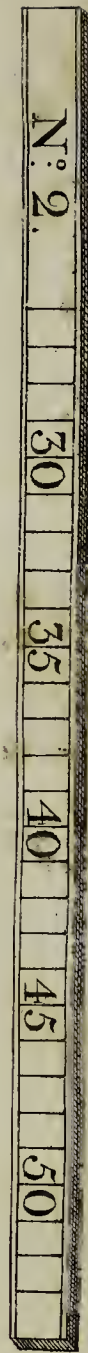
the merits of his new instrument, and of the various Hydrometers now in use; trusting, that when their properties have been duly considered, the opinion of the Society will have proper weight with Government, in establishing that Hydrometer which may be found most worthy of their approbation.

Your Memorialist, as in duty bound,
will ever pray.

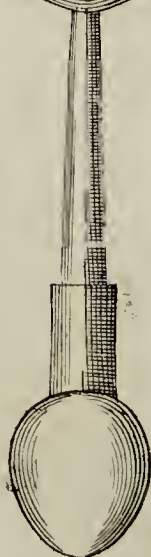
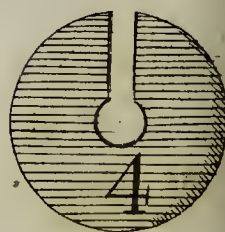
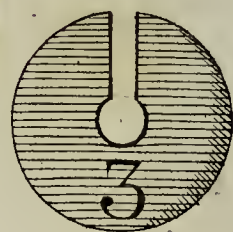
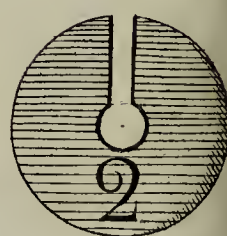
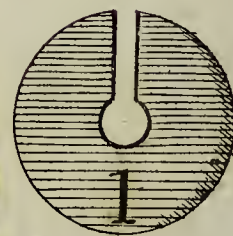
Nov. 4th, 1789.

DESCRIPTION of MATTHEW QUIN'S *improved* HYDROMETER for SPIRITS and WORTS.

THIS Hydrometer is made in hard metal ; and is therefore not so liable to be bruised or out of repair as fine copper, of which Hydrometers are usually made ; and is so constructed as to ascertain, in the most plain and expeditious manner, the strength of any spirit, from alcohol to water ; with the concentration and specific gravity of each different strength : and discovers also the weight of worts, &c. with four weights only ; which, according to the old construction of Hydrometers, would require a far greater number of weights. The side of the square stem of the instrument, engraved, A, B, C, &c. to Z, shews the strength of any spirit, from alcohol to water ; and the three other sides, numbered, 1, 2, 3, are adapted for worts, &c. As the density of fluids alters with heat and cold, every different strength has a peculiar degree of contraction and dilatation
which



Quin's
 UNIVERSAL HYDROMETER
 For ascertaining
 the Strength
 of Spirits and
 Worts with 4
 Weights only.



which is considered in dividing the sliding rule belonging to, and fold with, the Hydrometer.

DIRECTIONS *for the use of* MATTHEW
QUIN'S HYDROMETER.

FIND the heat of the spirit by the thermometer; and bring the star on the sliding rule to the degree of heat marked on the thermometer scale, and against the number of the weight, and letter on the stem. You have the strength of the spirit pointed out on the sliding rule; which is lettered and numbered at the instruments and weights.

Example. — Suppose the heat of the spirit 65° by the thermometer; and of such strength as to sink the Hydrometer to D, on the stem, without any weight; then put the star to 65° of the thermometer, and against D; you have seventy-five gallons to the hundred over-proof: at this strength the concentration is five gallons (marked above 75); and the specific gravity is nearly

O 4

eight

eight hundred and eleven, as marked below D: so that, if seventy-five gallons of water are added to one hundred gallons of this spirit, the mixture will be hydrometer-proof; but will only produce in measure one hundred and seventy gallons. Again, let the heat be 50° , and the spirit to require the weight N^o 1 to sink the instrument to I, on the stem; then put the star to 50° of heat, and against I, on the sliding rule you have $52\frac{1}{8}$ gallons to the hundred over-proof, concentration $2\frac{3}{4}$ gallons, and the specific gravity eight hundred and fifty-four.

If the instrument, with the weight N^o 2, should sink to Q, on the stem, and the heat 41° , it shews the strength 19 gallons, to the hundred over-proof, concentration $\frac{3}{4}$, specific gravity 905.

If the spirit be at 32° of heat, and the weight N^o 3 sinks the instrument to letter S, on the stem, it shews the liquor to be thirteen gallons in the hundred under proof, concentration $\frac{1}{4}$, specific gravity 945.

30° of heat, and the instrument sinking to M, with weight N° 4, shews fifty-seven gallons in the hundred under-proof, concentration nearly $\frac{1}{2}$ a gallon, specific gravity $976\frac{3}{4}$. So of the rest.

In ascertaining the strength or gravity of worts, the weight N° 4 is always to continue on the Hydrometer; and the weights N° 1, 2, 3, are adapted to the sides, N° 1, 2, 3, of the square stem; which discovers the exact gravity of the worts.

The instrument is adjusted so as to sink in rain water, at 60° of the thermometer, with the weight N° 1, to W, on the side of the stem N° 1, and shews to 26° heavier than water.

The side N° 2, with its corresponding weight N° 2, shews from 26 to 53 degrees; and the side N° 3 ascertains from 53 to 81 degrees, or $40\frac{1}{2}$ pounds per barrel heavier than water; two degrees on the stem being a pound per barrel.

Use

Use of the Hydrometer in ascertaining the Gravity of two or more Worts.

RULE.

Multiply the gravity of each wort by its respective number of barrels, or gallons. Divide the sum of the products by the number of gallons, or barrels. The quotient will be the mean gravity required.

Suppose First Wort, 30 barrels,
 at - - 60° gravity.
 Second Wort, 20 barrels,
 at - - 35° gravity.

60°	35°
30 barrels	20 barrels

1800

700

700

50) 2500 (50° mean gravity required.

2500

....

N. B.

N. B. When the heat of the worts cannot be conveniently tried at 60° of the thermometer, the following little table will shew the number of divisions to be added for the heat.

Degrees of the Thermometer,	60,	0	} Degrees of the Hydrometer to be added,
	72,	1	
	82,	2	
	91,	3	
	99,	4	

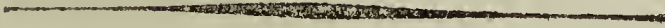
Although the above table may not be found philosophically true, yet it will not err a quarter of a pound per barrel in any gravity used for fermentation. For the use of those who are more particular in this respect, Mr. Quin has completed a scale, which they may apply to their own degrees of heat.



P A P E R

I N

COLONIES AND TRADE.



COLONIES AND TRADE.

IN the fourth volume of these Transactions an Account is given of the introduction of the Cinnamon-tree into the Island of Jamaica; and it is with singular satisfaction the Society are now enabled to lay before the Public the following Letter from Dr. DANCER; which contains a history of the growth of that valuable tree, with such facts relative to it as leave no room to doubt its being that species which produces the true Cinnamon; a spice hitherto brought to Europe only from the Island of Ceylon.

On the receipt of the Letter from Dr. Dancer, application was made to Mr. Long for the paper therein mentioned: that which is said to have been sent to Mr. Wilson not having been received, and Mr. Long having complied with the

Society's request, and communicated the following paper to them, the SILVER MEDAL was voted to Dr. DANCER for the observations contained therein, and Thanks given to Mr. LONG for the obliging manner in which he had communicated it to the Society.

SIR,

YOUR favour came safe to hand; and I acknowledge the obligation I am under to you for communicating to me the sentiments of the Society for the Encouragement of Arts, Manufactures, and Commerce, respecting the specimens of Jamaica Cinnamon; as likewise for acquainting me with the honour the Society have been pleased to confer upon me, in electing me a corresponding member. I have to request the favour of you to express my thanks in suitable terms, and to assure the Society that I shall use my utmost endeavours to deserve the mark of respect shewn me, by
communicating

communicating such useful observations as my limited situation may enable me to make, respecting the Cinnamon, or whatever else relates to the objects the Society have in view.

I have delayed thus long answering your favour, from the hope of being able to comply with your request, in sending further specimens of the Cinnamon bark, accompanied with some other products of the tree; as, the distilled water, oil (called Ol. Malabathri), and camphor; but from many other avocations I have not had it in my power to fulfil my intention; yet have no doubt, from the trials I have made, the Society will be satisfied of the utility of the products.

Notwithstanding the flourishing state of our trees, and the pains that have been taken to multiply them, they are not yet sufficiently numerous to afford the quantity of Cinnamon specified in the advertisement of the Society, offering a premium for the im-
P
portation

portation of it. I have desired Edward Long, Esq. of Wimpole-street, to submit to your inspection a short paper on the Cinnamon tree, which I gave in last year to the House of Assembly of this Island: it contains the best answer I am at present able to give to the enquiries respecting the growth, culture, and management.

The botanical writers and voyagers who have written on the Cinnamon-tree, are very deficient in that information we want. They have descanted upon the beauties and virtues of the several parts of the tree, but said hardly any thing about the cultivation and management of it, or about the manner of taking the bark, which is rather a difficult operation.

I intend as soon as possible to transmit you the specimens before mentioned for the opinion of the Society, and shall not be wanting on any occasion to communicate what I think the Society may deem worthy their notice.

I shall

I shall be highly obliged to the Society for such seeds* and plants as are suited to this climate, and may be of use to the colony, or of advantage to commerce. I shall be happy to make them a return from this country, so fertile in useful and elegant plants.

The Turmeric and Galangals are plants that would answer well in cultivation here, if they had a market, and we knew how to cure them properly for exportation.

I am, SIR,

Your most obedient,

humble servant,

THOMAS DANCER.

*Botanic-Garden, Jamaica,
July 24th, 1789.*

Mr. MORE.

* Some seeds, of the the species of Kali, from which Barilla is prepared in Spain, have since been sent to Dr. Dancer.

Dr. DANCER'S ACCOUNT
OF THE
CINNAMON TREES
GROWING IN THE
ISLAND OF JAMAICA.

*A brief Account of the Culture and Uses of
the Cinnamon Tree.*

THE Cinnamon-trees of this Island have been raised from a few plants taken along with a large collection of other oriental exotics in a French ship, bound from the Isle of France to Hispaniola, and presented to the Botanic Garden by Lord Rodney, when he came down here, after his glorious victory of the 12th of April, 1782.

Upon comparing the parts of the tree with the description and figure given by
Burman

Burman and other botanists, it appears to be the real *Ceylon* Cinnamon, and of the best kind, called by the natives *Rasse Coronde: but the specimens of bark taken put it out of all doubt, being, in the opinion of the best judges, of an equal, if not superior quality to any imported from India.

The various and important uses to which the several parts of the plant are applied, make it an invaluable acquisition to the West-India colonies; and there can be no

P 3 impediment,

* Quasi dicas: acre, suave, ac dulce Cinnamomum, quod verum et præstantissimum habetur Cinnamomum.

Burmanni Thesaurus.

Alteræ species sunt,

2. Cahette Coronde, sine amarum.
3. Cappare Coronde, quia caphuræ saporem odoremque potentissimum reddit.
4. Welle Coronde, sine arenosum.
5. Sewel Coronde, vel mucilaginosum.
6. Nicke Coronde.
7. Dawel Coronde, sine tympani.
8. Catte Coronde, seu spinosum.
9. Mace Coronde, sine floridum.

Præter memoratas jam species, aliæ etiam Cinnamomi diversitates in Zeylona observantur.

impediment, except an impolitic prohibition, to its becoming an article of general cultivation, and of the most lucrative commerce.

None of the botanical writers whom I have had an opportunity of consulting, say much of the cultivation or propagation of the Cinnamon; and we have hardly had time to make sufficient observations on the subject of either; but for the information of the public, to whom it is a matter of some importance, I shall venture the few remarks which my own short experience enables me to offer.

The Cinnamon-plant, though (according to the account of travellers) it grows to the height of twenty or thirty feet, is, properly speaking, an arborefcient one, and not a tree of the common kind: it puts out numerous side-branches, with a dense foliage from the very bottom of the trunk; which furnishes an opportunity of obtaining a plenty of layers, and facilitates the pro-
 3 pagation

pagation of the tree, as it does not perfect its seeds in any quantity under six or seven years; when it becomes so plentifully loaded, that a single tree is sufficient almost for a colony.

The Cinnamon seems to delight in a loose, moist soil, and to require a southern aspect; the trees, thus planted, flourishing better than others growing in loam, and not so well exposed to the sun.

When healthy, it is (from layers) of a pretty quick growth, reaching in eight years the height of fifteen or twenty feet, is very spreading, and furnished with numerous branches, of a fit size for decortication. The seeds however are a long time in coming up, and the plants make small progress for the first year or two.*

P 4

The

* The birds appear to be very fond of the berries, and will, probably, propagate this tree in the same way they do many others every where over the island; so that in a short time it will grow spontaneously, or without cultivation.

The best Cinnamon bark, according to the different trials I have made, is taken from the small branches, of about an inch diameter, the larger limbs not being so easily decorticated, and not yielding so good, or so strong a Cinnamon. The smaller twigs, or those that have not acquired a cineritious bark, are too full of sap and mucilage, and have little *aroma*.

It is the *liber*, or inner bark, that constitutes the Cinnamon, from which the two external barks must be carefully and entirely separated, or they vitiate the flavour of the Cinnamon. To do this with dexterity, and to raise the bark from the wood, requires some practice; but there may perhaps be an easier method than that which I have made use of; which was that of a common pruning-knife. The bark being thus separated, the smaller pieces are to be placed within the larger; which, by exposure to the sun or the air, presently coil up, and require no further preparation.

A dry

A dry season, I apprehend, is the proper one for taking the bark ;* as I have found the Cinnamon not so strong after long or heavy rains. Cinnamon seems to be much more retentive of its virtues than any of the other spices ; but it will certainly be proper to protect it, when taken, as much as possible, from the air and moisture, by close packing in cedar chests.

Having thus communicated all that I am able from my own observations, respecting the culture and preparation of the Cinnamon, I shall add what I know with respect to the uses of its several parts,

The leaves, whether recent or dried, are so strongly impregnated with an *aroma*, similar to the Cinnamon, that they are on all occasions a good succedaneum for the bark, both in cookery and medicine. Distilled, they give an excellent simple and
spirituous

* The month of May is the time for taking it in Ceylon.

spirituous water, and an essential oil, of the nature of oil of cloves. Powdered, they are a good aromatic species, or mareschal perfume.

Every part of the tree, according to writers of the best authority, affords some useful product. To them I must refer, till I have had opportunity for experiment. I shall therefore conclude this imperfect sketch by a quotation from the author before mentioned.

‘ Arbor Cinnamomi, jure merito, regina
 ‘ omnium arborum vocari meretur. Ex
 ‘ floribus enim aqua, oleum, spiritus, et
 ‘ conserva penetrantissima, et summi usus,
 ‘ in arte medica, producuntur: ex foliis
 ‘ pulvis carminativus in colicæ passionibus,
 ‘ tympanitide, ad tormina intestinorum, &c.
 ‘ Ex illis etiam aqua, oleum stillatit. sy-
 ‘ rupus, ol. coct. ad externos usus optimum
 ‘ præparatur. Fructus etiam dant aquam et
 ‘ oleum fortiff. distill. et coctum; unde em-
 ‘ plastra,

‘ plaftra, et linimenta penetrantiffima. De
 ‘ cortice hujus arboris nil dicas, quum apud
 ‘ plures alios auctores, et ipfum vulgum de
 ‘ ejus incomparabilibus virtutibus fatis con-
 ‘ flet: fed præter hæc omnia radix imprimis
 ‘ hujus arboris plurimas offert medicinas,
 ‘ cujus cortex excellentiffimum eft alexi-
 ‘ pharmacum, et fudoriferum in morbis
 ‘ venenatis, et malignis efficaciffimum, quæ
 ‘ per diffillationem et preparationem ex-
 ‘ hibet aquam, et oleum camphoræ, immo
 ‘ veram camphoram.

‘ Tot tantæque variæ res, et medicamina
 ‘ ex unâ hâc arbore procedunt, ut jufta fit
 ‘ occasio demirandi, quî fit, ut una hæc
 ‘ arbor omnigenus nobis medicinas exhi-
 ‘ beat.’

Burmanni Theſaurus Zelanicus.

Edit. 1737. page 65.

R E W A R D S

BESTOWED BY THE

S O C I E T Y,

From JANUARY 1st, 1789,

To JUNE, 1790.

THE UNIVERSITY OF CHICAGO

PHYSICS DEPARTMENT

7 5 6 1 7 2 3

PHYSICS DEPARTMENT

PHYSICS DEPARTMENT

R E W A R D S

BESTOWED IN

A G R I C U L T U R E.

TO MATTHEW STEPHEN-
SON, Esq. of Smardall-
Hall, near Appleby in West-
moreland, for improving Waste
Moor Land, the SILVER ME-
DAL. See Vol. VII. page 38.

Class 67. To Mr. JOHN BOOTE, of
Atherston upon Stour, near
Stratford upon Avon, for an
account of the comparative cul-
ture of Wheat, the GOLD
MEDAL. See Vol. VII. page
15.

Class 90. To Mr. JOHN BALL, surgeon,
at Williton, near Watchett,
Somersetshire, for having raised
upwards

upwards of four hundred plants of the *Rheum Palmatum*, or true Rhubarb, the GOLD MEDAL. See Vol. VII. page 34.

Class 1. To JOHN MORSE, Esq. of Norwich, for twenty-five acres of land planted with Acorns, at Sprowston, in the county of Norfolk, the GOLD MEDAL. See page 3. of the present Volume.

Class 17. To Mr. JOSEPH COWLI-SHAW, of Hodsock park, Nottinghamshire, for having planted seven thousand six hundred and fifty-six Spanish Chestnut-trees, on Carlton Forest, the GOLD MEDAL. See page 6.

Class 25. To RICHARD SLATER MILNES, Esq. of Foyston, near Ferrybridge, Yorkshire, for ha-
ving

ving planted twenty thousand English Elms, the GOLD MEDAL. See page 9.

Class 34. TO RICHARD SLATER MILNES, Esq. of Foyston, for having planted two hundred thousand Larch - trees, the GOLD MEDAL. See page 9.

Class 35. TO Mr. GEORGE WRIGHT, of Anston, near Bawtree, in the county of York, for having planted eleven thousand five hundred and seventy - three Larch-trees, at Gildingwells, in the said county, the SILVER MEDAL. See page 13.

Class 51. TO RICHARD Lord Bishop of LANDAFF, for having planted twenty thousand Ash, and other forest trees, on the Grove estate, near Ambleside, Westmoreland,

Westmoreland, the GOLD MEDAL. See page 15.

Class 97. To Mr. WILLIAM HOL-
LINS, of Heel, in the parish
of Berriew, Montgomeryshire,
for his account of preventing
the disease called the Curled
Potatoe, TEN POUNDS. See
page 18.

To Mr. WILLIAM PITT,
of Pendeford, near Wolver-
hampton, Staffordshire, for his
account of preventing the dis-
ease called the Curled Potatoe,
TEN POUNDS. See page 31.

To Mr. JOHN HOLT, of
Walton, near Liverpool, for
his account of preventing the
disease called the Curled Pota-
toe, TEN POUNDS. See page
36.

Class

Class 99. To Mr. EDWARD PRES-
GRAVE, of Bourn, in Lin-
colnshire, for feeding Cattle
with Potatoes, TWENTY GUI-
NEAS. See page 48.

Class 104. To Mr. THOMAS NOYES,
of Park Farm, near Eltham,
Kent, for Stall-feeding Horses
with green Vegetables, the
SILVER MEDAL and TEN
GUINEAS. See page 59.

Class 109. To Mr. JOHN BALL, of
Williton, Somersetshire, for ha-
ving raised six hundred plants
of the *Rheum Palmatum*, or
true Rhubarb, the GOLD ME-
DAL. See page 66.

To Mr. WILLIAM HAY-
WARD, of Banbury, Oxford-
shire, for his account of the
culture and cure of Rhubarb,
the

the SILVER MEDAL. See page 75.

Class 136. To THOMAS QUAYLE, Esq. of Reading, Berks, for gaining one hundred and ten acres and nineteen perches of Land from the Sea, in Dengey Hundred, Effex, the GOLD MEDAL. See page 83.

To Mr. THOMAS LEE, of Tolesbury, near Malden, Effex, for gaining thirty acres and eighteen perches of Land from the Sea, at Goldhanger, in Effex, the SILVER MEDAL. See page 114.

Class 105. To Mr. JOHN LANE, of Farrington, in the county of Devon, for account of Bees, FIVE GUINEAS. See page 122.

To

To Mr. SIMON MANLEY,
of Topsham, in Devonshire,
for account of Bees, FIVE
GUINEAS. See page 130.

To Sir THOMAS HANMER,
Bart. of Bettisfield Park, near
Whitchurch, Shropshire, for
Waste Lands improved in North
Wales, the SILVER MEDAL.

To Mr. WILLIAM DANN,
of Gillingham, near Rochester,
Kent, for comparative Culture
of Turneps, the SILVER ME-
DAL.

C H E M I S T R Y.

To Mr. JOSEPH SENYOR, of
Aston, near Rotheram, York-
shire, for his discovery of
Generating Yeast, TWENTY
POUNDS. See page 141.

POLITE AND LIBERAL ARTS.

TO Miss FRANCES GUISE,
of Dartmouth-street, West-
minster, for a Drawing after a
Picture painted by the Rev.
Mr. Peters, the SILVER ME-
DAL. Subject, the Three Holy
Children.

TO Miss MARGARET
ELIZA CUNLIFFE, of New
Norfolk-street, for a piece of
Needle-work, the greater SIL-
VER PALLET. Subject, Lord
Thomas and the fair Annette.

TO Miss CATHARINE
CHARLOTTE RAPER, of
Cheyne - Row, Chelsea, the
greater SILVER PALLET, for a
Drawing. Subject, portrait in
crayons of a Young Gentleman.

Class 170.

Class 170. To Mr. ROBERT HUNT, Craven-Row, Kentish-Town, Middlesex, the SILVER MEDAL, for a Drawing. Subject, the Marriage of Cana, after Tintoret.

Class 171. To Miss EMMA SMITH, of Great George-street, Westminster, the GOLD MEDAL, for a Drawing after a Picture painted by Paul Veronese. Subject, the Woman taken in Adultery.

Class 173. To Mr. JOHN CHARLES LOCHÉE, of Poland-street, Oxford-Road, for a Bust of His Royal Highness the Prince of Wales, the SILVER MEDALLION. A cast of the Bust is in the Great Room of the Society.

Class 186. To Mr. JAMES PILKINGTON, of Derby, for his work,

Q 4

entitled

entitled, “ A View of the present State of Derbyshire,”
 TWENTY - FIVE GUINEAS,
 being part of the premium offered for NATURAL HISTORY, with an intent to obtain such an account of the products of the several counties of England and Wales, as may shew what Arts or Manufactures are most likely to be advantageously carried on therein.

MANUFACTURES.

To the Rev. GEORGE SWAYNE, of Pucklechurch, near Bristol, for his account of, and apparatus for, breeding Silkworms, the SILVER MEDAL. See Vol. VII. page 120.

To Mr. THOMAS GREAVES, of Millbank, near Warrington,
 ton,

ton, for making Paper from Raw Vegetables, TEN GUINEAS. See Vol. VII. page 111.

To Mr. SAMUEL SHOLL, for his improved Silk-loom, the SILVER MEDAL, and THIRTY GUINEAS. See page 166.

Clafs 188. To Mr. SALVATORE BERTEZEN, of Kennington-lane, Surry, for five pounds of Silk, produced in England, in the year 1789, the GOLD MEDAL. See page 163.

M E C H A N I C K S.

To JOHN HARRIOT, Esq. of Great Stambridge, Effex, for his Harrow for repairing Roads, TEN GUINEAS. See Vol. VII. page 196.

To

To Captain EDWARD PARKENHAM, of the Royal Navy, for his Substitute for a Rudder, the GOLD MEDAL. See Vol. VII. page 205.

For taking Whales by means of the Gun-Harpoon, in the year 1788, to THOMAS SINGTON, ONE GUINEA; to JAMES BROWN, ONE GUINEA; to JAMES HAGAN, ONE GUINEA; to BENJAMIN BROWN, ONE GUINEA; to MICHAEL MATTHEWS, ONE GUINEA; to GEORGE LESHLEY, TWO GUINEAS; to CHARLES FOX, TWO GUINEAS; and to HENRY ALLISON, THREE GUINEAS. See Vol. VII. page 176.

To Mr. HUGH HUGHES, of Coggeshall, Essex, for his Machine
chine

chine for twitching Wool,
TWELVE GUINEAS. See
Vol. VII. page 193.

To Mr. WILLIAM MO-
COCK, of Mill-lane, South-
wark, for his improved Jack
for raising Weights, TWENTY
GUINEAS. See page 179.

To Mr. GEORGE SYL-
VESTER, of Willow-Walk,
Southwark, for his method of
twisting Cords and Ropes in
a small space, TWENTY
GUINEAS. A model of this
Machine remains in the So-
ciety's Repository.

To Monsieur HANIN, of
Paris, for a Machine, shewing
at one view the comparative
Weights of different Countries,
TWENTY GUINEAS. This
Machine remains in the So-
ciety's Repository.

To

To Mr. TIM. MARSHALL,
of Jermyn-street, for his im-
proved secret Escutcheons, SIX
GUINEAS. See Vol III. page
163.

To Mr. THOMAS ARM-
STRONG, of Burnside, near
Kendal, Westmoreland, for
a Model of a Machine for
obtaining a regular circular
motion from a reciprocating
movement varied in any di-
rection, the SILVER MEDAL
and FIVE GUINEAS.

Class 198. To Mr. CHARLES MOORE,
of East Smithfield, for an im-
proved Gun for throwing Har-
poons, TEN GUINEAS. A
Model of this Gun is reserved
in the Society's Repository.

Class 197. For taking Whales by means
of the Gun-Harpoon, in 1789,
to GEORGE LESHLEY, SIX
GUINEAS; JOHN WHELDON,
SIX

SIX GUINEAS; JOHN DRYDEN, THREE GUINEAS; THOMAS WILKINSON, THREE GUINEAS; JOHN STEEL, THREE GUINEAS; and to MARSHALL SUMMERS, THREE GUINEAS; being Three Guineas for each Fish so taken. See page 181 & seq.

To Mr. COLIN M'ENZIE, of Castle-street, Oxford-street, for his improved Sash-fastener, TEN POUNDS.

To Mr. JAMES BAYLEY, No. 212, Shoreditch, for a Machine for enlarging or reducing Plans, &c. TEN GUINEAS.

To Mr. MATTHEW QUIN, of Ball's Pond, near Newington, Middlesex, for his improvement

provement of Hydrometers for Spirits and Worts, the SILVER MEDAL and TWENTY GUINEAS. See page 193.

COLONIES AND TRADE.

To Dr. THOMAS DANCER, of Jamaica, for an account of the Cinnamon-trees growing in Jamaica, the SILVER MEDAL. See page 207.

Class 228. To Dr. ISAAC TITFORD, of Spanish Town, Jamaica, for Cashew Gum imported, the GOLD MEDAL.

PRESENTS

P R E S E N T S

RECEIVED BY THE

S O C I E T Y,

From JANUARY 1st, 1789,

To JUNE 1st, 1790.

With the Names of the DONORS.

The SOCIETY OF ANTIQUARIES, of
London.

ARCHÆOLOGIA, or Miscellaneous
Tracts, relating to Antiquity, 8 vols.
quarto.

The MEDICAL SOCIETY at London.

The second volume of Memoirs of the
Medical Society at London, octavo.

Mr. JAMES ELPHINSTONE.

Propriety ascertained in her Picture, one vol. quarto, by James Elphinstone.

Monfieur l'ABBÉ MANN.

Recueil des Mémoires Académiques, 1 vol. quarto, by l'Abbé Mann.

Monfieur le BARON DE COURCET.

Mémoires fur l'Agriculture du Boulonnois, by le Baron de Courcet.

VALENTINE GREEN, Esq.

The 3d volume of Acta Historica Reginarum Angliæ.

JAMES ADAM, Esq.

Practical Essays on Agriculture, 2 vols. octavo, by James Adam, Esq.

Mr. SAMUEL HOOPER.

Supplement to a Treatise on Ancient Armour, quarto, by Francis Grose, Esq.

The 1st volume of the Antiquities of Scotland, by Francis Grose, Esq.

The Hon. COUNT BERCHTOLD.

Essays to direct the Patriotic Traveller, 2 vols. octavo, by the Honourable Count Berchtold.

The ROYAL SOCIETY.

The second part of the 78th volume, and the first part of the 79th volume, of the Philosophical Transactions.

The TRANSLATOR.

The Art of dying Wool, Silk, and Cotton, translated from the French, and presented by the Translator.

Mr. FRANCESCO SASTRES.

The twelve first numbers of a work entitled, Il Mercurio Italico, or a General Account concerning the Literature, fine Arts, useful Discoveries, &c. of all Italy, in Italian and English, by Mr. Sastres.

R

Mr.

Mr. JOHN FRAZER.

A short History of an American Grass, called *Agrostis Cornucopiæ*, with a dried specimen, by Mr. Frazer,

By the AUTHOR.

A pamphlet entitled, *Philoxylon*.

Mr. CHARLES BEAUMONT.

A Treatise on the Coal-trade, and a Supplement to ditto, by Mr. Beaumont.

Messrs. EDMUND FRY and Co.

Specimens of Printing - types, by Edmund Fry.

Mr. JOSIAH TAYLOR.

Account of the principal Lazarettos in Europe, by the late John Howard, Esq.

The Tuscan Code of Laws.

An historical Account of the Bastille, by the late John Howard, Esq.

A Catalogue and different Specimens of Cloth collected in three Voyages of Captain Cook to the Southern Hemisphere.

GEORGE UNWIN, Esq.

Two books entitled, Letters and Remarks on the Tins of Cornwall and Banca, with a view to open the trade from this country for that article to India, Persia, &c. with samples of the tins of the two countries.

GEORGE EDWARDS, Esq. M. D.

The Royal and Constitutional Regeneration of Great-Britain, 2 vols. quarto.

The practical Means of effectually exonerating the Public Burdens, by George Edwards, Esq.

The Rev. GEORGE SWAYNE.

Gramina Pascua ; or, A collection of Specimens of the Pasture Grasses, with their Linnæan and English Names, by the Rev. George Swayne.

R 2

Mr.

Mr. HATCHETT.

Two different Views of the Coach of Safety.

SIR JOHN SINCLAIR, Bart.

A model of a Dutch Barn.

The Hon. EAST-INDIA COMPANY.

Two bushels China Hemp-Seed.

The Hon. COUNT BERCHTOLD.

The Tuscan Arch, to prevent children being overlaid.

Mr. KELLMAN.

A new-invented Last for stretching shoes.

Mr. WILLIAM WINLAW.

A Spring and Index fixed to a Whipple-tree for ascertaining the force exerted in the Draught of Carriages.

A CATA-

A CATALOGUE

OF THE

MODELS AND MACHINES

Received since the Publication of the Seventh Volume of the Society's Transactions, with the Numbers, as they are arranged in the Class to which they belong.

CHEMISTRY. CLASS II.

No. V.

AN improved Hydrometer for Spirits and Worts, by Mr. Matthew Quin; for which the Silver Medal and Twenty Guineas were voted to him as a bounty.

MECHANICKS.

MECHANICKS. CLASS IV.

CXVIII. A Model shewing a method of obtaining a circular Motion from a reciprocating one, by Mr. Thomas Armstrong; for which the Silver Medal and Five Guineas were voted to him as a bounty.

CXIX. A Model of a Machine for twisting small Cordage, &c. in a less space than usual, by Mr. George Sylvester; for which Twenty Guineas were voted to him as a bounty.

CXX. A Model of an improved Gun, by Mr. Charles Moore, for throwing Harpoons; for which a premium of Ten Guineas was adjudged to him.

CXXI.

- CXXI. A Machine for reducing Plans, Maps, &c. by Mr. James Bayley; for which Ten Guineas were voted to him as a bounty.
- CXXII. Two improved secret Efcutcheons, by Mr. Tim. Marshall; for which Six Guineas were voted to him as a bounty.
- CXXIII. An engraved Brass Plate and Index, which shews at one view the different Weights, with their relation to each other, of many places in Europe, by Monsieur Hanin; for which Twenty Guineas were voted to him as a bounty.
- CXXIV. A Spring and Index fixed to a Whipple-tree for ascertaining the force exerted in the Draught of Carriages, &c. presented by Mr. William Winlaw.

CXXVI

- CXXVI. An improved Sash-fastener, by Mr. Colin M'Enzie; for which Ten Pounds were voted to him as a bounty.

A L I S T

OF THE

OFFICERS of the SOCIETY,

A N D

C H A I R M E N

OF THE SEVERAL

C O M M I T T E E S.

P R E S I D E N T.

ROBERT Lord Romney, LL. D.
F. R. S.

V I C E - P R E S I D E N T S.

Charles Duke of Richmond, K. G. F. R. S.

Hugh Duke of Northumberland, K. G.
F. R. S.

Jacob Earl of Radnor.

George Augustus Lord Heathfield, K. B.

Honourable Charles Marsham, F. R. S.

Edward Hooper, Esq. F. R. S.

Owen Salusbury Breton, Esq. F. R. and
A. S.

Sir Herbert Mackworth, Bart. F. R. S.

James Davison, Esq.

Sir William Dolben, Bart.

Sir Watkin Lewes, Knt.

S E C R E T A R Y.

Mr. Samuel More.

A S S I S T A N T - S E C R E T A R Y.

Mr. John Samuel.

R E G I S T E R A N D T E M P O R A R Y C O L L E C T O R.

Mr. George Cockings.

C H A I R M E N

CHAIRMEN OF THE SEVERAL
COMMITTEES.

Elected March 23, 1789.

A C C O M P T S.

James Hebert, Esq.

Francis Stephens, Esq. F. A. S.

C O R R E S P O N D E N C E A N D P A P E R S.

Valentine Green, Esq. F. A. S.

Robert Dower, Esq.

P O L I T E A R T S.

C. Whitefoord, Esq. F. R. S.

John Parish, Esq. F. A. S.

A G R I C U L T U R E.

John Pratt, Esq.

Rev. James Cooke.

MANU-

MANUFACTURES.

Mr. Baynes,
Samuel Dunn, Esq.

MECHANICKS.

Joseph Hurlock, Esq. F. R. S.
Nathaniel Bishop, Esq.

CHEMISTRY.

Mr. Kendrick,
Granville Penn, Esq.

COLONIES AND TRADE.

Mr. Joseph Pourcin,
John Baker, Esq.

MISCELLANEOUS MATTERS.

Mr. Jacob,
Mr. A. Hall.

P R E M I U M S

OFFERED BY THE

S O C I E T Y

FOR THE ENCOURAGEMENT OF

ARTS, MANUFACTURES,

A N D

C O M M E R C E,

I N

THE YEAR M.DCC.XC.

TO THE
P U B L I C.

ADELPHI-BUILDINGS,

April 14, 1790.

THE chief objects of the attention of the Society for the Encouragement of Arts, Manufactures and Commerce, in the application of their Rewards, are Ingenuity in the several branches of the POLITE and LIBERAL ARTS, useful Discoveries and Improvements in AGRICULTURE, MANUFACTURES, MECHANICKS, and CHEMISTRY, or the laying open any such to the Public; and in general, all such useful Inventions, Discoveries, or Improvements, (though not mentioned in the Book of Premiums) as may appear to have a tendency to the advantage of Trade and Commerce. The Society therefore, in pursuance of their plan, propose to bestow the following Premiums.

Premiums

Premiums for Planting and Husbandry.

1. ACORNS. For having set, between the first of October, 1789, and the first of April, 1790, the greatest quantity of strong land, not less than ten acres, with Acorns, and seeds or cuttings of other trees, and for the effectually fencing and preserving the same, in order to raise timber and underwood; the GOLD MEDAL.

2. For the second greatest quantity of land, not less than five acres, sown or set agreeably to the above conditions, the SILVER MEDAL.

CERTIFICATES of setting or sowing agreeably to the above conditions, and that there are not fewer than three hundred young Oaks on each acre, to be delivered to the Society on or before the first Tuesday in November, 1790.

3, 4. The same premiums are extended one year further.

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CERTIFICATES to be produced on or before the first Tuesday in November, 1791.

5, 6. The same premiums are extended one year further.

CERTIFICATES to be produced on or before the first Tuesday in November, 1792.

7, 8. The same premiums are extended one year further.

CERTIFICATES to be produced on or before the first Tuesday in November, 1793.

9. RAISING OAKS. To the person who shall have raised the greatest number of Oaks, not fewer than five thousand, either from young plants, or from acorns, in woods, parks, or forests, that have long been under timber, and effectually fenced and preserved the same, in order to secure a succession of oak timber in this kingdom; the GOLD MEDAL.

10. For the next greatest quantity, not fewer than three thousand, the SILVER MEDAL.

CERTIFICATES that there were on the land, upon the first of November, 1790, at least the number of young Oak-trees required, in a thriving condition, effectually fenced and preserved, with an account of the methods pursued in making and managing the plantation, to be produced to the Society on or before the first Tuesday in January, 1791.

11, 12. The same premiums are extended one year further.

CERTIFICATES to be produced on or before the first Tuesday in January, 1792.

13, 14. The same premiums are extended one year further.

CERTIFICATES to be produced on or before the first Tuesday in January, 1793.

15. OBSERVATIONS ON OAK.
To the person who shall furnish the best observations and experiments on the various obstructions to the growth of Oak-trees, with apposite remedies for the same; and

shall also ascertain those appearances on Oak-trees, which may serve to show them to have arrived at the proper period, and to be in a fit state to be felled, for the purposes of ship-building, and other uses; the GOLD MEDAL, or TWENTY GUINEAS.

The accounts to be produced to the Society on or before the third Tuesday in December, 1790.

16. The same premium is extended one year further. The accounts to be produced on or before the third Tuesday in December, 1791.

17. CHESNUTS. For having sown or set, between the first of October, 1789, and the first of April, 1790, the greatest quantity of dry loamy land, not less than six acres, with a mixture of Spanish Chesnuts, and the seeds or cuttings of other trees adapted to such soil, and for effectually fencing and preserving the same, in order to raise timber; the GOLD MEDAL.

18. For the second greatest quantity, not less than four acres, the SILVER MEDAL.

CERTIFICATES of sowing or setting agreeably to the above conditions, and that there are not fewer than three hundred Chesnut plants, in a thriving state, on each acre, to be delivered to the Society on or before the first Tuesday in November, 1790.

19, 20. The same premiums are extended one year further.

CERTIFICATES to be delivered on or before the first Tuesday in November, 1791.

21, 22. The same premiums are extended one year further.

CERTIFICATES to be delivered on or before the first Tuesday in November, 1792.

23, 24. The same premiums are extended one year further.

CERTIFICATES to be delivered on or before the first Tuesday in November, 1793.

25. ELM. For having planted the greatest number of the English Elm, not less

less than eight thousand, between the twenty-fourth of June, 1789, and the twenty-fourth of June, 1790, and for the having effectually fenced and preserved the same, in order to raise timber; the GOLD MEDAL.

26. For the second greatest number, not less than five thousand, the SILVER MEDAL.

27. For the third greatest number, not less than four thousand, the SILVER MEDAL.

CERTIFICATES of the having planted agreeably to the above conditions, and specifying the distance of the trees, must be delivered to the Society; on or before the first Tuesday in November, 1790.

28, 29, 30. The same premiums are extended one year further.

CERTIFICATES of the having planted agreeably to the above conditions, that the plants were in a healthy and thriving state two years at least after making the plantation, and specifying the distance of the plants,

plants, to be delivered to the Society on or before the first Tuesday in November, 1792.

31, 32, 33. The same premiums are extended one year further.

CERTIFICATES to be produced on or before the first Tuesday in November, 1793.

34, 35, 36. The same premiums are extended one year further.

CERTIFICATES to be produced on or before the first Tuesday in November, 1794.

37. LARCH. For having planted out, between the twenty-fourth of June, 1789, and the twenty-fourth of June, 1790, in a mixed plantation of forest-trees, the greatest number of Larch-trees, not fewer than five thousand, and for having effectually fenced and preserved the same, in order to raise timber; the GOLD MEDAL.

38. For the next greatest number, not fewer than three thousand, the SILVER MEDAL.

CERTIFICATES of the number of plants, that they were in a healthy and thriving
state

state two years at least after they were planted out, with a general account of the methods used in making the plantation, to be delivered to the Society on or before the last Tuesday in December, 1793.

39, 40. The same premiums are extended one year further.

CERTIFICATES to be produced on or before the last Tuesday in December, 1794.

41, 42. The same premiums are extended one year further.

CERTIFICATES to be produced on or before the last Tuesday in December, 1795.

43. SILVER FIR. For having planted out, between the twenty-fourth of June, 1789, and the twenty-fourth of June, 1790, in a mixed plantation of forest-trees, the greatest number of Silver Firs, not fewer than two thousand; and for having effectually fenced and preserved the same, in order to raise timber; the GOLD MEDAL.

44. For the next greatest number, not fewer than one thousand, the SILVER MEDAL.

CERTIFICATES of the number of plants, that they were in a healthy and thriving state two years at least after they were planted out, with a general account of the methods used in making the plantation, to be delivered to the Society on or before the last Tuesday in December, 1793.

45, 46. The same premiums are extended one year further.

CERTIFICATES to be produced on or before the last Tuesday in December, 1794.

47, 48. The same premiums are extended one year further.

CERTIFICATES to be produced on or before the last Tuesday in December, 1795.

49. HUNTINGDON WILLOW. For the greatest number of acres, not less than three, planted in the year 1789, with Huntingdon Willows; the number of cuttings to be at least one thousand on each acre, properly fenced and secured; the GOLD MEDAL.

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CERTIFICATES to be produced on or before the last Tuesday in December, 1790.

50. The same premium is extended one year further.

CERTIFICATES to be produced on or before the last Tuesday in December, 1791.

51. UPLAND OR RED WILLOW. For the greatest number of acres, not less than three, planted before the end of April, 1789, with Upland or Red Willow, properly fenced and secured, the number of plants on each acre to be at least twelve hundred; the GOLD MEDAL.

CERTIFICATES of the number of plants, and that they were in a thriving state at the time of signing such certificates, to be produced to the Society on or before the last Tuesday in April, 1791.

52. The same premium is extended one year further.

CERTIFICATES to be produced on or before the last Tuesday in April, 1792.

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It is well known that this species of willow thrives well on dry sandy land.

53. ALDER. For having planted, in the year 1789, the greatest number of Alders, not less than three thousand, on an estate the property of one person; the GOLD MEDAL.

CERTIFICATES of the number of the plants, and that they were in a thriving state two years at least after being planted, to be delivered to the Society on or before the last Tuesday in December, 1792.

54. The same premium is extended one year further.

CERTIFICATES to be delivered on or before the last Tuesday in December, 1793.

55. The same premium is extended one year further.

CERTIFICATES to be delivered on or before the last Tuesday in December, 1794.

56. ASH. For having sown or set, in the year 1788, the greatest quantity of
land,

land, not less than six acres, with Ash for timber, intermixed with the seeds, cuttings, or plants of such other trees as are adapted to the soil; the GOLD MEDAL.

57. For the next greatest quantity, not less than four acres, the SILVER MEDAL.

CERTIFICATES of the sowing or setting agreeably to the above conditions, and that there are not fewer than one hundred Ash plants on each acre, to be delivered to the Society on or before the last Tuesday in December, 1790.

58. ASH. For having sown or set, in the year 1790, the greatest quantity of land, not less than six acres, with Ash for timber, intermixed with seeds, cuttings, or plants of such other trees as are adapted to the soil; the GOLD MEDAL.

59. For the next greatest quantity, not less than four acres, the SILVER MEDAL.

CERTIFICATES of the sowing or setting agreeably to the above conditions, that there are not fewer than one hundred
Ash

Ash plants on each acre, in a thriving and healthy condition, two years at least after the sowing or setting, with a general account of the methods used in making the plantation, to be delivered to the Society on or before the last Tuesday in December, 1793.

60, 61. The same premiums are extended one year further.

CERTIFICATES to be delivered on or before the last Tuesday in December, 1794.

62. MIXED TIMBER-TREES. To the person who shall have inclosed, planted, or sown the greatest number of acres, not less than ten, with the best sorts of Forest trees, for timber, between the first of October, 1786, and the first of May, 1788; the GOLD MEDAL.

An Account of the methods used in making the plantations, and of the nature of the soil, together with proper Certificates that the trees were in a thriving and healthy state two years at least after making

making the plantation, to be delivered to the Society on or before the first Tuesday in November, 1790.

63. The same premium is extended one year further.

The ACCOUNTS and CERTIFICATES to be delivered to the Society on or before the first Tuesday in November, 1791.

64. The same premium is extended one year further.

The ACCOUNTS and CERTIFICATES to be delivered to the Society on or before the first Tuesday in November, 1792.

65. The same premium is extended one year further.

The ACCOUNTS and CERTIFICATES to be delivered to the Society on or before the first Tuesday in November, 1793.

66. MULBERRY CUTTINGS, OR TREES. For having planted the greatest number of White or Black Mulberry Cuttings

tings or Trees, not fewer than three hundred, in the year 1788, for the purpose of feeding Silkworms; the GOLD MEDAL, or TWENTY POUNDS.

67. For the second greatest quantity, not fewer than one hundred and fifty, the SILVER MEDAL, or TEN POUNDS.

CERTIFICATES of such planting, with the manner of culture, and that the trees were growing in the month of July, 1790, to be produced to the Society on or before the first Tuesday in November, 1790.

68, 69. The same premiums are extended one year further.

CERTIFICATES to be produced on or before the first Tuesday in November, 1791.

70, 71. The same premiums are extended one year further.

CERTIFICATES to be produced on or before the first Tuesday in November, 1792.

72. MULBERRY TREES IN HEDGE ROWS. To the person who shall plant, in the year 1789, the greatest number, not fewer than one hundred layers, of the Black or White Mulberry, in Hedge Rows, at a distance not less than twelve feet from each other, TEN POUNDS.

73. For the next greatest number, not less than fifty, FIVE POUNDS.

CERTIFICATES of the number of plants, and that the trees were then in a growing state, to be produced to the Society on or before the first Tuesday in October, 1790.

** * * The Candidates for planting all kinds of Trees are to certify, that the respective Plantations are properly fenced and secured, and particularly to state the Condition the Plants were in at the time of signing such Certificates.*

Any information which the Candidates for the foregoing Premiums may choose to communicate, relative to the methods made use of
in

in forming the Plantation, or promoting the growth of the several Trees, or any other observations that may have occurred on the subject, will be thankfully received.

74. TREES FOR USE WHEN EXPOSED TO THE WEATHER. To the person who shall send the most satisfactory account, verified by experiments, to determine which of the following trees is of the greatest utility for timber or poles, for use, when exposed to the weather; viz.

Larch,	Black Poplar,
Ash,	Spanish Chesnut,
Willow,	Alder,
Beech,	Silver Fir;
Lombardy Poplar,	

the GOLD MEDAL.

The ACCOUNTS to be produced on or before the second Tuesday in December, 1790.

75. The same premium is extended one year further.

The

The ACCOUNTS to be produced on or before the second Tuesday in December, 1791.

76. PLANTING BOGGY OR MORASSY SOILS. For an account of the best set of experiments sent by the planter, or his representative, to ascertain the comparative advantages of planting boggy or morassy soils with White Poplar, Black Poplar, Lombardy Poplar, and Willow; the GOLD MEDAL, or TWENTY GUINEAS.

It is required that not less than half an acre be planted with each, and the plants to be not more than four feet asunder.

It is also required that the plantation stand fourteen years, at the end of which to be all cut down and measured, or accurately measured standing; the Certificates of the measure and value, and that the whole is properly fenced and secured, to be produced on or before the first Tuesday in January, 1792.

N. B. Any information relating to the state of the plantation, if sent to the So-

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ciety between the time of planting, and claiming the premium, will be thankfully received.

77. The same premium is extended one year further.

CERTIFICATES to be produced on or before the first Tuesday in January, 1793.

78. The same premium is extended one year further.

CERTIFICATES to be produced on or before the first Tuesday in January, 1794.

79. The same premium is extended to the year 1796.

CERTIFICATES to be produced on or before the first Tuesday in January, 1797.

80. The same premium is extended one year further.

CERTIFICATES to be produced on or before the first Tuesday in January, 1798.

81. COMPARATIVE CULTURE OF WHEAT. For the best set of experiments

periments made on not less than eight acres, four of which to be sown broadcast and four drilled, to ascertain whether it is most advantageous to cultivate Wheat by sowing it in the common broadcast way, or by drilling it in equidistant rows, hoeing the intervals; the GOLD MEDAL, or the SILVER MEDAL and TWENTY GUINEAS.

It is required that an account of the nature and condition of the land on which the experiments are made, together with an account of the produce of the Corn, be produced to the Society on or before the first Tuesday in February, 1791.

82. The same premium is extended one year further.

The ACCOUNTS to be produced to the Society on or before the first Tuesday in February, 1792.

83. COMPARATIVE CULTURE OF WHEAT. For the best set of experiments made on not less than eight

acres of land, four of which to be sown broad-cast, and four dibbled, to ascertain whether it is most advantageous to cultivate Wheat by sowing it in the common broad-cast way, or by dibbling it in equidistant rows, hoeing the intervals; the GOLD MEDAL, or the SILVER MEDAL and THIRTY GUINEAS.

It is required that an account of the nature and condition of the land on which the experiments are made, together with an account of the produce of the Corn, be produced to the Society on or before the first Tuesday in February, 1791.

84. The same premium is extended one year further.

The ACCOUNTS to be produced to the Society on or before the first Tuesday in February, 1792.

85. BEANS AND WHEAT. To the person who shall have planted or drilled, between the first of September, 1788, and the first of March, 1789, the greatest quantity

quantity of land, not less than ten acres, with Beans, and shall sow the same land with Wheat in the same year, 1789 ;
 TWENTY GUINEAS.

It is required that an account of the sort and quantity of Beans, the time of planting or drilling, and of reaping or mowing them, the produce per acre threshed, the application of the straw, the expence of planting or drilling, hand or horse - hoeing, the distance of the rows, and the quality of the soil, together with CERTIFICATES of the number of acres, and that the land was actually sown with Wheat in the year 1789, be produced on or before the first Tuesday in November, 1790.

N. B. The Society have been informed that Beans may be drilled or planted so early as the month of December, from whence may be derived the advantage of an early harvest ; in which case the straw will be far more valuable than that from a later planting or drilling.

86. The same premium is extended one year further.

The ACCOUNTS to be produced on or before the first Tuesday in November, 1791.

87. DRILL HUSBANDRY. To the person who, in the year 1790, shall have cultivated the greatest quantity of land, not less than four hundred acres, under the Drill system, the wheat sown in the autumn of the year 1789 included; the GOLD MEDAL.

An Account of the quality of the soil, of the various crops, and of the times of drilling and hoeing, with Certificates of the quantity of land, and the general appearance of the crop, to be delivered on before the third Tuesday in February, 1791.

88. The same premium is extended one year further.

The ACCOUNTS and CERTIFICATES to be delivered on or before the third Tuesday in February, 1792.

89. TURNEPS. For the best account of experiments made on at least six acres of land, to determine the comparative advantage of the drill or broad-cast method in the cultivation of Turneps; the GOLD MEDAL, or the SILVER MEDAL and TEN GUINEAS.

The ACCOUNTS to be delivered in, on or before the third Tuesday in April, 1791.

90. The same premium is extended one year further.

The ACCOUNTS to be delivered on or before the third Tuesday in April, 1792.

91. GREEN VEGETABLE FOOD. For the best account, confirmed by experiments, of the Vegetable Food (Cabbages and Turneps excepted), growing in the months of March and April, that will most increase the milk in Mares, Cows, and Ewes, at that season; provided such food can be cultivated at an expence that will admit of its being applied to the above purposes; the GOLD MEDAL, or the SILVER MEDAL and TEN GUINEAS.

CERTIFICATES to be produced on or before the second Tuesday in November, 1790.

92. The same premium is extended one year further.

CERTIFICATES to be produced on or before the second Tuesday in November, 1791.

93. COMPARATIVE CULTURE OF THE TURNEP-ROOTED CABBAGE. To the person who shall produce to the Society the best account of the most satisfactory experiments, made on at least four acres of land, to ascertain the comparative advantages of the culture of the Turnep-rooted Cabbage, by sowing it broad-cast, and hoeing out the plants, as is practised with the common Turnep, or by sowing the seed in nurseries, and transplanting the plants at proper distances, hoeing the intervals; the SILVER MEDAL and TEN POUNDS.

It is required that at least two acres be cultivated in each manner, and CERTIFICATES of the culture, with an account of the soil, expence, and produce of each separately, be produced on or before the first Tuesday in October, 1791.

94. The same premium is extended one year further.

CERTIFICATES and ACCOUNTS to be produced on or before the first Tuesday in October, 1792.

95. The same premium is extended one year further.

CERTIFICATES and ACCOUNTS to be produced on or before the first Tuesday in October, 1793.

96. TURNEP-ROOTED CABBAGE.
For having raised and duly cultivated Turnep-rooted Cabbage, in the year 1789, for the feeding Cattle or Sheep, on the greatest number of acres, not less than ten, and
giving

giving an account of the soil, culture, time and manner of feeding off, produce, and the effects on Cattle or Sheep fed with it; the GOLD MEDAL.

97. For the next greatest number of acres, not less than five, the SILVER MEDAL and TEN GUINEAS.

CERTIFICATES of the quantity of land, with the accounts, to be produced on or before the last Tuesday in October, 1790.

98. The same premium is extended one year further.

CERTIFICATES to be produced on or before the last Tuesday in October, 1791.

99. The same premium is extended one year further.

CERTIFICATES to be produced on or before the last Tuesday in October, 1792.

100. CURE OF THE CURLED POTATOE. To the person who shall discover
discover

discover to the Society the nature and cause of the disease in the Potatoe-plant called THE CURLED POTATOE, and point out an effectual cure, the whole verified by repeated and satisfactory experiments, the GOLD MEDAL, or THIRTY POUNDS.

The ACCOUNTS to be produced to the Society on or before the third Tuesday in November, 1790.

101. The same premium is extended one year further.

The ACCOUNTS to be produced on or before the third Tuesday in November, 1791.

102. POTATOES FOR FEEDING CATTLE AND SHEEP. To the person who, in the year 1789, shall have cultivated the greatest quantity of land, not less than four acres, with Potatoes, for the sole purpose of feeding Cattle and Sheep, the GOLD MEDAL, or TWENTY GUINEAS.

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CERTIFICATES, with satisfactory Accounts of the expence and manner of cultivating the Potatoes, and the application of them to the above purposes, and the success that has attended the use of them, to be delivered to the Society on before the second Tuesday in November, 1790.

103. The same premium is extended one year further.

CERTIFICATES to be delivered on or before the second Tuesday in November, 1791.

104. The same premium is extended one year further.

CERTIFICATES to be delivered on or before the second Tuesday in November, 1792.

N. B. Should any Gentleman have already cultivated Potatoes for the purposes mentioned in the above advertisement, any information from him on the subject will be thankfully received by the Society.

105. CULTIVATING ROOTS AND HERBAGE FOR FEEDING SHEEP AND BLACK CATTLE. For the most satisfactory experiments made between Michaelmas, 1789, and the first of May, 1790, in order to ascertain which of the following plants can be cultivated and housed, or otherwise secured for winter fodder, to the greatest advantage, viz.

Turnep-rooted Cabbage,	Carrots,
Turnep Cabbage,	Parfneps,
Turneps,	Potatoes;

the GOLD MEDAL.

The ACCOUNTS to be produced on or before the first Tuesday in November, 1790.

It is required that the above roots be taken off the land by the last day of October, 1789; that a crop of Wheat may be sown in the same ground, and the particulars of the sowing and planting, taking up, produce, preserving, and application to the feeding Sheep and Black Cattle, be specified. The comparative experiments

experiments must be made between two or more of any of the above-mentioned plants, and not less than two acres be cultivated with each particular kind of plant.

N. B. Great advantage will arise to the Farmer occupying land in the neighbourhood of extensive commons, from the conveniency of keeping large flocks of Sheep, and herds of Cattle, if the difficulty of supporting them through the winter was obviated by a due knowledge of this practice.

106. The same premium is extended one year further.

CERTIFICATES to be produced on or before the first Tuesday in November, 1791.

107. STALL-FEEDING HORSES WITH GREEN VEGETABLES. To the person who shall keep the greatest number of Horses, not fewer than four, in the Stall or Stable, during the greatest number

number of months in the year, on Carrots, Potatoes, Lucern, Saintfoin, Clover, Vetches, or any other green vegetable food raised on land in his own possession; the SILVER MEDAL and TEN GUINEAS.

It is required that the number of horses so fed, the quantity of land employed in raising the green vegetable food, the quantity of hay and corn (if any) consumed, the state and condition of the horses, an account of the work done by them, and of the quantity of dung obtained, as near as can be ascertained, be fully and particularly specified.

The ACCOUNTS and CERTIFICATES to be produced to the Society on or before the second Tuesday in February, 1791.

107*. The same premium is extended one year further. The ACCOUNTS and CERTIFICATES to be produced to the Society on or before the second Tuesday in February, 1792.

108. STOCKS OF BEES. To the person who shall have in his possession,
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being his own property, the greatest number of Stocks of Bees, not fewer than thirty, and who shall in the most judicious manner provide for them plenty of such vegetables as afford them honey and wax; the GOLD MEDAL or TWENTY POUNDS.

109. For the next greatest number, not fewer than twenty stocks, the SILVER MEDAL, or TEN POUNDS.

Proper CERTIFICATES of the number of Stocks, and that they have been in the possession of the Claimant during the preceding summer, together with a particular account of the vegetables provided for their sustenance, and the manner in which they have been managed, to be produced to the Society on or before the first Tuesday in November, 1790.

110, 111. The same premiums are extended one year further.

CERTIFICATES to be delivered on or before the last Tuesday in November, 1791.

112. CULTIVATING THE TRUE RHUBARB. For having raised, before the end of the year 1790, the greatest number of plants, not less than three hundred, of *Rheum Palmatum*, or true Rhubarb, the GOLD MEDAL.

113. For the next greatest number, not less than two hundred plants, the SILVER MEDAL.

CERTIFICATES of the number of plants, that they stand at least four feet asunder, that they have been in a thriving state during the preceding summer, with an account of the soil, culture, and aspect, to be produced on or before the second Tuesday in February, 1791.

114, 115. The same premiums are extended one year further.

CERTIFICATES to be produced on or before the second Tuesday in February, 1792.

116. RHUBARB. For the greatest quantity of Rhubarb of British growth, not less than twenty pounds weight, equal to such as is commonly sold in the shops under the name of Turkey or Russia Rhubarb; five pounds of which to be produced as a sample, with Certificates that the remainder is of equal goodness, and a particular Account of the manner of culture and cure, on or before the first Tuesday in November, 1790; the GOLD MEDAL.

117. For the next greatest quantity, not less than ten pounds weight, the SILVER MEDAL.

118, 119. The same premiums are extended one year further.

The SAMPLES and CERTIFICATES to be produced on or before the first Tuesday in November, 1791.

120. ASCERTAINING THE COMPONENT PARTS OF ARABLE LAND. To the person who shall produce
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duce to the Society the most satisfactory set of experiments, to ascertain the due proportion of the several component parts of Arable Land, in one or more counties in Great Britain, by an accurate analysis of it; and who, having made a like analysis of some poor land, shall, by comparing the component parts of each, and thereby ascertaining the deficiencies in the poor soil, improve a quantity of it not less than two acres, by the addition of such parts as the former experiments shall have discovered to be wanting therein, and therefore probably the cause of its sterility; the GOLD MEDAL, or FIFTY GUINEAS.

It is required that the manurings, ploughings, and crops of the improved land, be the same after the improvement as before; and that a minute account of the produce in each state, of the weather, and of the various influencing circumstances, together with the method made use of in analysing the soils, be produced, with proper Certificates, and the chemical results of the analysis, which

are to remain the property of the Society, on or before the last Tuesday in November, 1790.

It is expected that a quantity, not less than six pounds, of the rich, of the poor, and of the improved soils, be produced with the Certificates.

N. B. Among the methods or processes made use of by Chemists, and called DRY or MOIST, the latter only appears adapted to the ascertaining the respective proportions of the component parts of Arable earth.—Dr. Shaw, in his Chemical Lectures; Dr. Home, in his Principles of Agriculture; Dr. George Fordyce, in his Elements of Agriculture; and Sir Torben Bergmen, in his “*Dissertation sur les Terres Géoponiques*,” have treated of these subjects.

121. The same premium is extended one year further.

The ACCOUNTS to be produced on or before the last Tuesday in November, 1791.

122. The same premium is extended one year further.

The ACCOUNTS to be produced on or before the last Tuesday in November, 1792.

123. The same premium is extended one year further.

The ACCOUNTS to be produced on or before the last Tuesday in November, 1793.

124. The same premium is extended one year further.

The ACCOUNTS to be produced on or before the last Tuesday in November, 1794.

125. IMPROVING LAND LYING WASTE. For the best Account of a method of improving any of the following soils, being land lying waste or uncultivated, viz. Clay, Gravel, Sand, Chalk, Moor or Peat-earth, and Bog; verified by experiments on not less than ten acres of land, to

be produced on or before the second Tuesday in December, 1790; the GOLD MEDAL, or the SILVER MEDAL and TWENTY GUINEAS, for each.

126. For the next in merit, the SILVER MEDAL.

The soil, manner of improvement, expence, and product, are required to be fully explained.

127, 128. The same premiums are extended one year further.

The ACCOUNTS to be produced on or before the second Tuesday in December, 1791.

129, 130. The same premiums are extended one year further.

The ACCOUNTS to be produced on or before the second Tuesday in December, 1792.

131. MANURES. To the person who shall give the most satisfactory account, verified

verified by accurate experiments, on what soil the application of Marl, Chalk, Lime, or Clay, severally, as manures, be most beneficial; the GOLD MEDAL, or the SILVER MEDAL and TWENTY GUINEAS.

It is required that each experiment be made on one acre, and that they be continued four years, the same kind of grain being sown the same year on the several spots.

It is also required, that, if different manures are compared, the experiments be made on similar soils, lying near each other.

An ACCOUNT of the nature of the soil, manure, and the quantity laid on, with all expences, and crops, to be delivered, with specimens of the soil and manure, on or before the first Tuesday in January, 1791.

132. The same premium is extended one year further.

The ACCOUNTS and Specimens to be produced on or before the first Tuesday in January, 1792.

133. MANURES. For the most satisfactory set of experiments, to ascertain the comparative advantages of the following Manures, used as Top-dressings, on Grass or Corn Land, viz. Soot, Coal-Ashes, Wood-Ashes, Lime, Night-soil; the GOLD MEDAL, or the SILVER MEDAL and TWENTY GUINEAS.

It is required that not less than half an acre of land be appropriated to each Manure, the soils similar, and lying near each other; and if the Manure be used on Corn Land, then it is required that the same kind of Grain be sown the same year on each spot; the experiments to be continued not less than two years.

An ACCOUNT of the nature of the soil, quantity and expence of the Manure, and Crops, with Certificates, to be produced on or before the first Tuesday in December, 1790.

134. The same premium is extended one year further.

The

The ACCOUNT and CERTIFICATES to be produced on or before the first Tuesday in December, 1791.

135. The same premium is extended one year further,

The ACCOUNT and CERTIFICATES to be produced on or before the first Tuesday in December, 1792.

136. IMPROVING WASTE MOORS. For the improvement of the greatest number of acres of Waste Moor-Land, not less than one hundred, the GOLD MEDAL.

It is required that the land before improvement be absolutely uncultivated, and in a great measure useless; that in its improved state it be inclosed, cultivated, and divided into fields, sufficient for the use and occupation of a tenant.

CERTIFICATES of the number of acres, of the quality of the Moor so improved, of the mode and expence of the improvement, the state it is in as to the proportion of grass
to

to arable, and the average value thereof, to be produced on or before the first Tuesday in February, 1791.

137. The same premium is extended one year further.

CERTIFICATES to be produced on or before the first Tuesday in February, 1792.

138. The same premium is extended one year further.

CERTIFICATES to be produced on or before the first Tuesday in February, 1793.

139. The same premium is extended one year further.

CERTIFICATES to be produced on or before the first Tuesday in February, 1794.

140. GAINING LAND FROM THE SEA. To the person who shall produce to the Society an account of the best method, verified by actual experiment, of gaining Land from the Sea, not less than twenty acres, on the coast of England or Wales, the GOLD MEDAL.

CERTI-

CERTIFICATES of the quantity of Land, and that the experiments were begun after the first of January, 1785, to be produced to the Society on or before the first Tuesday in October, 1790.

N. B. The Society have been credibly informed, that Land has been gained on the coast of Holland, by fixing rows of whisps of straw upright in the sand, at about a foot distant from each other, or by fixing stakes at proper distances from each other, and wattling straw-bands between them.

141. The same premium is extended one year further.

CERTIFICATES to be produced on or before the first Tuesday in October, 1791.

142. The same premium is extended one year further.

CERTIFICATES to be produced on or before the first Tuesday in October, 1792.

143. The same premium is extended one year further.

CERTI-

CERTIFICATES to be produced on or before the first Tuesday in October, 1793.

144. MACHINE TO ANSWER THE PURPOSE OF REAPING OR MOWING CORN. For inventing a Machine to answer the purpose of mowing or reaping Wheat, Rye, Barley, Oats, or Beans, by which it may be done more expeditiously and cheaper than by any method now practised, provided it does not shed the Corn or Pulse more than the methods in common practice, and that it lays the straw in such a manner as that it may be easily gathered up for binding; TEN GUINEAS.

The MACHINE, with CERTIFICATES that at least three acres have been cut by it, to be produced to the Society on or before the second Tuesday in December, 1790.

Simplicity and cheapness in the construction will be considered as principal parts of its merit.

145. The same premium is extended one year further.

The

The MACHINE and CERTIFICATES to be produced on or before the second Tuesday in December, 1791.

146. IMPROVED HOE. To the person who shall produce to the Society the most improved or best constructed Horse or Hand Hoe, superior to any hitherto in use, for the purpose of clearing from Weeds, and loosening the Soil in, the intermediate spaces of all Crops of Corn, sown in equidistant rows, and which shall earth up the young Plants at the same time; the GOLD MEDAL, or TWENTY GUINEAS.

A HOE, with CERTIFICATES of its having been successfully used, to be produced to the Society on or before the first Tuesday in December, 1790.

146*. The same premium is extended one year further.

The HOE, with CERTIFICATES, to be produced on or before the first Tuesday in December, 1791.

147. DESTROYING THE GRUB OF THE COCKCHAFER. To the person who shall discover to the Society an effectual method, verified by repeated and satisfactory trials, of destroying the Grub of the Cockchafer, or of preventing or checking the destructive effects which always attend Corn, Peas, Beans, and Turneps, when attacked by those insects; the SILVER MEDAL and TEN GUINEAS.

The ACCOUNTS to be produced on or before the first Tuesday in January, 1791.

148. The same premium is extended one year further.

The ACCOUNTS to be produced on or before the first Tuesday in January, 1792.

149. DESTROYING THE WIRE-WORM. To the person who shall discover to the Society an effectual method, verified by repeated and satisfactory trials, of destroying the insect called the Wire-Worm, or of preventing or checking the destructive effects which always attend Corn, Beans, Peas,

Peas, or Pulse, when attacked by those insects; the SILVER MEDAL and TEN GUINEAS.

The ACCOUNTS to be produced to the Society on or before the first Tuesday in January, 1791.

*Premiums for Discoveries and Improvements
in Chemistry, Dying, and Mineralogy.*

150. KELP. For the greatest quantity, not less than four tons, of Kelp, containing a much larger proportion of Alkaline Salt than any Kelp now made for sale, TWENTY POUNDS.

A Specimen of one hundred weight to be produced on or before the first Tuesday in January, 1791; together with CERTIFICATES that the whole quantity is equal to the specimen, and made in Great Britain or Ireland of Sea-weed.

151. BARILLA. For the greatest quantity of merchantable Barilla, not less than half a ton, made from Spanish Kali raised in Great Britain, the GOLD MEDAL.

A Sample of not less than twenty-eight pounds, with a CERTIFICATE that half a ton has been made, to be produced on or before the first Tuesday in January, 1791.

152. PRESERVING SEEDS OF VEGETABLES. For the best method of preserving the Seeds of Plants in a state fit for vegetation a longer time than has hitherto been practised, such method being superior to any known to the public, and verified by sufficient trial; to be communicated to the Society on or before the first Tuesday in December, 1790; the GOLD MEDAL.

153. DESTROYING SMOKE. For the best account, ascertained by proper experiments, of a method of destroying or burning the smoke of fires belonging to Steam Engines, Furnaces employed in calcining or smelting Metals, or other large works, in order to prevent annoyance to the neighbourhood; to be produced on or before the first Tuesday in January, 1791; the GOLD MEDAL.

154. The same premium is extended one year further.

The ACCOUNTS to be produced on or before the first Tuesday in January, 1792.

155. CANDLES FROM RESIN. To the person who shall discover to the Society the best method of so reducing the inflammable quality of Resin, as to adapt it to the purposes of making Candles fit for common use, at a price much inferior to that of Candles made of Tallow only; the GOLD MEDAL, or THIRTY GUINEAS.

Six pounds at least of the Candles so prepared, with an ACCOUNT of the process, to be delivered to the Society on or before the first Tuesday in December, 1790.

156. REFINING FISH-OIL. For disclosing to the Society an effectual method of purifying Fish-Oil from the glutinous matter that encrusts the wicks of lamps, and extinguishes the light, though fully supplied with oil, the GOLD MEDAL, or FIFTY GUINEAS.

It is required that the whole of the process be fully and fairly disclosed, in order
that

that satisfactory experiments may be made by the Society to determine the validity of the claim; and that CERTIFICATES that not less than twenty gallons have been purified according to the process delivered in, must, together with two gallons of the Oil in its unpurified state, and two gallons so refined, be produced to the Society on or before the second Tuesday in February, 1791.

The same premium is extended one year further.

CERTIFICATES and Samples to be produced on or before the second Tuesday in February, 1792.

157. SUBSTITUTE FOR, OR PREPARATION OF, YEAST. For discovering to the Society an effectual Substitute for Yeast, or preparation of Yeast, which, after being kept two months, shall be fit for fermenting liquors, and raising bread; the GOLD MEDAL, or TWENTY POUNDS.

Specimens of the Substitute, or of the preparation of Yeast, sufficient for trials,

together with a paper sealed up, and containing an account of the composition of the Substitute, or method of preparing the Yeast, to be produced on or before the last Tuesday in November, 1790.

158. INCREASING STEAM. To the person who shall discover to the Society a method, verified by actual experiments, of increasing the quantity or the force of Steam, in Steam Engines, with less fuel than is usually employed, provided that in general the whole amount of the expences in using Steam Engines may be considerably lessened; the GOLD MEDAL, or THIRTY GUINEAS.

To be communicated to the Society on or before the first Tuesday in January, 1791.

N. B. As it is well known there are methods of preventing the ebullition of liquids by the addition of particular matters in the boiling, it is submitted to the consideration of the ingenious, whether, by
the

the addition of some matters, or by some mechanical operations, the boiling and evaporation may not be increased.

159. The same premium is extended one year further.

To be communicated to the Society on or before the first Tuesday in January, 1792.

160. PREVENTING THE DRY-ROT IN TIMBER. To the person who shall discover to the Society the cause of the Dry-Rot in Timber, and disclose a certain method of prevention superior to any hitherto known, the GOLD MEDAL, or the SILVER MEDAL and TEN GUINEAS.

The ACCOUNTS of the cause, and method of prevention, confirmed by repeated experiments, to be produced to the Society on or before the second Tuesday in December, 1790.

161. The same premium is extended one year further.

The ACCOUNTS to be produced on or before the second Tuesday in December, 1791.

162. FINE BAR-IRON. To the person in England or Wales, who shall make, in the year 1789, the greatest quantity of Bar-Iron, not less than ten tons, with Coak, from Coak Pigs, equal in quality to the best Iron imported from Sweden or Ruffia, and as fit for converting into Steel; the GOLD MEDAL.

SAMPLES, not less than one hundred weight, with CERTIFICATES that the whole quantity is of equal quality, to be produced to the Society on or before the first Tuesday in January, 1791.

163. The same premium is extended one year further.

SAMPLES and CERTIFICATES to be delivered on or before the first Tuesday in January, 1792.

164. METHOD OF PREPARING WHITE LEAD WHICH SHALL NOT BE PREJUDICIAL. To the person who shall discover to the Society a method of preparing White Lead, in a manner that shall not be prejudicial to the health of the workmen employed either in making or using it, and will answer all the purposes for which White Lead is at present used, FIFTY POUNDS.

A quantity of the White Lead so prepared, with an account of the process made use of, and CERTIFICATES that not less than one ton has been manufactured in the same manner, to be produced to the Society on or before the second Tuesday in November, 1790.

165. The same premium is extended one year further.

CERTIFICATES and ACCOUNTS to be produced to the Society on or before the second Tuesday in November, 1791.

166. SUBSTITUTE FOR THE BASIS OF PAINT. To the person who shall produce to the Society the best Substitute, superior to any hitherto known, for the Basis of Paint, equally proper for the purpose as the White Lead now employed; such Substitute not to be of a noxious quality, and which may be afforded at a price not materially higher than that of White Lead; THIRTY POUNDS.

A quantity of the Substitute, not less than fifty pounds weight, with an ACCOUNT of the process used in preparing it, and CERTIFICATES that at least five hundred weight has been manufactured, to be produced to the Society on or before the second Tuesday in November, 1790.

167. The same premium is extended one year further.

CERTIFICATES and ACCOUNTS to be produced on or before the second Tuesday in November, 1791.

168. REFINING BLOCK TIN. To the person who shall discover to the Society the best method of purifying or refining *Block Tin*, in such manner as to render it fit for the finer purposes to which *Grain Tin* is now solely applied, the GOLD MEDAL, or FIFTY POUNDS.

CERTIFICATES that not less than three tons have been refined or purified, with a full detail of the process, and a quantity, not less than one hundred weight, of the Tin so refined, to be produced to the Society on or before the first Tuesday in November, 1790.

168*. The same premium is extended one year further.

CERTIFICATES to be produced on or before the first Tuesday in November, 1791.

Premiums

Premiums for promoting the Polite Arts.

169. HONORARY PREMIUMS FOR DRAWINGS. For the best Drawing of any kind, made with Crayons, Chalk, Black Lead, Pen, Indian Ink, or Bister, by young Gentlemen under the age of twenty - one, sons or grandsons of Peers, or Peereffes in their own right, of Great Britain or Ireland; to be produced on or before the first Tuesday in March, 1791; the HONORARY MEDAL of the Society IN GOLD.

170. The same IN SILVER, for the second in merit.

171, 172. The same premiums will be given, on the like conditions, to young Ladies, daughters or grand-daughters of Peers, or Peereffes in their own right, of Great Britain or Ireland.

173. HONORARY PREMIUMS FOR DRAWINGS. For the best Drawing of any kind, made with Crayons, Chalk, Black Lead, Pen, Indian Ink, or Bister, by young Gentlemen under the age of twenty-one; to be produced on or before the first Tuesday in March, 1791; the GOLD MEDAL.

174. For the next in merit, the SILVER MEDAL.

175, 176. The same premiums will be given for Drawings by young Ladies.

N. B. Persons professing any branch of the Polite Arts, or any business dependent on the Arts of Design, or the sons or daughters of such persons, will not be admitted Candidates in these Classes.

The following Premiums are offered in conformity to the Will of the late John Stock, of Hampstead, Esq.

177. SCULPTURE. For the best Model of the Bust of his Royal Highness the PRINCE of WALES, as large as the life, to be produced on or before the third Tuesday in February, 1791, a SILVER MEDALLION, with the following engraved inscription: *The Premium given by the Society for the Encouragement of Arts, Manufactures, and Commerce, in conformity to the Will of John Stock, of Hampstead, Esq.*

A Cast from the Model to which the Premium is adjudged, is to remain the property of the Society.

178. PORTRAIT. For the best Copy, in Oil Colours, of a Portrait of the late JOHN STOCK, of Hampstead, Esq. to be produced on or before the third Tuesday in February,

February, 1791, a SILVER MEDALLION, with the following engraved inscription: *The Premium given by the Society for the Encouragement of Arts, Manufactures, and Commerce, in conformity to the Will of John Stock, of Hampstead, Esq.*

179. DRAWINGS OF OUTLINES.

For the best Outline after an original group or cast, in plaster, of Human Figures, by persons of either sex under the age of sixteen, the principal figure not less than twelve inches; to be produced on or before the third Tuesday in February, 1791; the greater SILVER PALLET.

180. For the next in merit, the lesser SILVER PALLET.

N. B. These Drawings are to be made on Paper, with Chalk, Black Lead, Indian Ink, or Bister; and the originals either to be produced to the Society, or to be referred to for their examination.

181. DRAWINGS OF MACHINES.

For the best Perspective Drawing, by persons of either sex under the age of twenty-one years, of the Model of a Crane, by Mr. Bunce, in the Society's Repository, showing particularly the method of stopping the Wheel by the centrifugal force of the Ball, the greater SILVER PALLET; to be produced on or before the third Tuesday in February, 1791.

N. B. Such Candidates as propose to make Drawings for this Premium, will be admitted by the Register any day (Sundays and Wednesdays excepted) between the hours of ten and two.

The Drawing to which the Premium is adjudged, is to remain the property of the Society.

182. DRAWINGS OF LANDSCAPES. For the best Drawing of a Landscape after nature, by persons of either sex under twenty-one years of age, to be produced

produced on or before the third Tuesday in February, 1791, the greater SILVER PALLET.

183. For the next in merit, the lesser SILVER PALLET.

Each Candidate must mention, on the front of the Drawing, from whence the View was taken ; and the Drawings must be made with Chalk, Pen, Indian Ink, or Bister.

184. HISTORICAL DRAWINGS. For the best Historical Drawing, being an original composition, of five or more Human Figures ; the height of the principal figure not less than eight inches ; to be made with Crayons, Chalk, Black Lead, Pen, Indian Ink, or Bister, and to be produced on or before the third Tuesday in February, 1791 ; the GOLD PALLET.

185. For the next in merit, the greater SILVER PALLET.

186.

186. ENGRAVING IN THE LINE MANNER. To the Engraver who shall produce to the Society the best engraved Plate, executed by himself, of the dimensions of not less than twenty inches by sixteen inches, containing not fewer than three Human Figures, the principal figure not less than twelve inches high; to be engraved in the LINE MANNER, from any old or modern Picture; the GOLD PALLET, and TWENTY-FIVE GUINEAS.

The regular progress of the work, from the first Proof of the etching, to the finished impression of the Plate, to be produced to the Society on or before the first Tuesday in February, 1791.

187. The same premium is extended one year further.

The IMPRESSIONS to be delivered on or before the first Tuesday in February, 1792.

188. SURVEYS OF COUNTIES. To the person who, in the year 1791, shall complete

complete and publish an accurate Survey of any one County in England or Wales, on a scale of not less than one inch to a mile, for which rewards have not already been given by the Society, the GOLD MEDAL, or FIFTY POUNDS.

CERTIFICATES of the accuracy of the Survey, and that it was begun after the first of June, 1787, together with the Map, to be produced on or before the last Tuesday in January, 1792.

The Map to which the premium shall be adjudged, to remain the property of the Society.

N. B. The Society are already in possession of Surveys of the following Counties, viz. Devonshire, Derbyshire, Somersetshire, Northumberland, Suffolk, Leicestershire, Cumberland, and Lancashire.

189. The same premium is extended one year further.

The Survey to be begun after the first of June, 1788, and the Map to be produced

duced on or before the last Tuesday in January, 1793.

190. The same premium is extended one year further.

The Survey to be begun after the first of June, 1789, and the Map to be produced on or before the last Tuesday in January, 1794.

191. NATURAL HISTORY. To the Author who shall publish, in the year 1790, the Natural History of any County of England or Wales, the GOLD MEDAL, or FIFTY POUNDS.

It is required that the several natural productions, whether animal, vegetable, or mineral, peculiar to the county or found therein, be carefully and specifically arranged and described, in order that the Public may be enabled to judge what Arts or Manufactures are most likely to succeed in such County.

The

The Work to be delivered to the Society on or before the last Tuesday in January, 1791.

192. The same premium is extended one year further.

The Work to be delivered to the Society on or before the last Tuesday in January, 1792.

193. The same premium is extended one year further.

The Work to be delivered on or before the last Tuesday in January, 1793.

C O N D I T I O N S .

No person who has gained the first Premium in any Class, will be admitted a Candidate in a Class of an inferior age ; and no Candidate shall receive more than one Premium in one year ; nor will they who for two successive years shall gain the first Premium in one Class, be ever again admitted as Candidates in that Class.

No person shall ever be admitted a Candidate in any Class, in which he has three times obtained the whole of the first Premium.

No Candidate shall send in more than one Performance in any one Class.

All the Claims which are produced each year before the Committee of Polite Arts (to which Premiums or Bounties are adjudged)

judged) are to remain with the Society six weeks after the determination, unless the Candidates, for particular reasons, do apply to have their performances returned.

No Claim for a Premium in the Polite Arts will be admitted, that has obtained, or has been produced in order to obtain, a Premium, Reward, or Gratification, from any other Society, or any Academy or School.

All Performances that obtain Premiums in the Polite Arts, must be begun after the the publication of such Premiums.

Purposely to encourage real merit, and to prevent any attempts to impose on the Society, by producing Drawings which shall have been made or retouched by any other person than the Candidate, the Society is resolved, upon all occasions, with respect to the successful Candidates in

Classes 179 to 185 inclusive, to prove their abilities, by requiring a specimen made under the inspection of the Committee of Polite Arts, in every instance where such proof can be obtained.

*Premiums for encouraging and improving
Manufactures.*

194. SILK. For the greatest quantity of merchantable Silk, not less than ten pounds, produced by any one person in England, in the year 1790, the GOLD MEDAL.

SPECIMENS of the Silk, not less than one pound, with CERTIFICATES that the whole is of equal quality, and produced in England, to be delivered to the Society on or before the first Tuesday in January, 1791.

195. For the second greatest quantity, not less than five pounds, the SILVER MEDAL.

196. MACHINE FOR CARDING SILK. For the best Machine, superior to any now in use, for carding Waste Silk equally well as by hand; to be produced,

328 MANUFACTURES.

together with a specimen of the Cardings, on or before the first Tuesday in November, 1790; the GOLD MEDAL, or TWENTY POUNDS.

197. WEAVING FISHING-NETS.

For the best specimen of Plain Netting, for Fishing-Nets, superior to any hitherto in use, not less than twenty yards long, and six feet deep, woven in a Loom, or other Machine; to be produced to the Society on or before the second Tuesday in January, 1791; FIFTY GUINEAS.

N. B. It is expected that the Specimen produced be made in such a manner, as to be cut and joined without more loss than usual, that it have such a plain selvage as the common Fishing-Nets, and that the Knot be equally fast with those in Nets in common use, and as easily repaired.

198. A strong CLOTH being prepared in SWEDEN from HOP-STALKS, or BINDS, the Society will give the GOLD MEDAL, or TWENTY POUNDS, as a Pre-

mium for the best and greatest quantity of such Cloth, not less than twenty-five yards, made in England, and produced to the Society on or before the second Tuesday in December, 1790.

One pound at least of the Thread to be produced with the Claim.

199. The same premium is extended one year further.

The Cloth and Thread to be produced to the Society on or before the second Tuesday in December, 1791.

200. The same premium is extended one year further.

The Cloth and Thread to be produced to the Society on or before the second Tuesday in December, 1792.

201. PAPER FROM RAW VEGETABLE SUBSTANCES. To the person in England or Wales who shall make the greatest quantity, not less than fifty
reams,

330 MANUFACTURES.

reams, of the best and most useful Paper, from Raw Vegetable Substances, TWENTY GUINEAS.

CERTIFICATES of the making such Paper, and one ream of the Paper, to be produced on or before the first Tuesday in November, 1790.

N. B. The Society are in possession of two volumes, containing a great variety of specimens of Paper made from Raw Vegetables, viz. Thistles, Potatoe-Haum, Poplar, Hop-binds, &c. which volumes may be inspected by any person on application to the Register.

Premiums

Premiums for Inventions in Mechanicks.

202. TRANSIT INSTRUMENT.

To the person who shall invent and produce to the Society a cheap and portable Transit Instrument, which may easily be converted into a Zenith Sector, capable of being accurately and expeditiously adjusted for the purposes of finding the Latitudes and Longitudes of places, and superior to any portable Transit Instrument now in use, the GOLD MEDAL, or THIRTY GUINEAS.

To be produced on or before the last Tuesday in January, 1791.

203. GUN-HARPOON. For every Whale taken by means of the Gun-Harpoon, to the person who first strikes such fish therewith, THREE GUINEAS.

N. B. Proper CERTIFICATES of the taking such Whales, in the year 1790, signed by the Master, or by the Mate when

the Claim is made by the Master, to be delivered to the Society on or before the last Tuesday in December, 1790.

204. GUN FOR THROWING HARPOONS. To the person who shall produce to the Society the best improvement in the construction of a Gun for throwing Harpoons, so as to render it more manageable than those at present in use, the SILVER MEDAL, or TEN GUINEAS.

The GUN to be produced to the Society on or before the first Tuesday in December, 1790.

205. DRIVING BOLTS INTO SHIPS. To the person who shall invent and produce to the Society a Model, shewing a method of driving Bolts into Ships, particularly those of Copper, without splitting the Head or bending them, with more dispatch, in all directions, and tighter, than by any means hitherto known or in use, TWENTY GUINEAS.

The

The Model to be produced to the Society on or before the first Tuesday in February, 1791.

206. IMPROVEMENT OF THE HAND VENTILATOR. To the person who shall produce to the Society on or before the last Tuesday in February, 1791, a Portable Ventilator, to be worked by hand, better adapted and more efficacious for extracting foul air from Gaols, Prisons, and Ships, than any now known, or in use, the GOLD MEDAL, or TWENTY GUINEAS.

207. CRANES FOR WHARFS. To the person who shall invent and produce to the Society a Model of a Crane for Wharfs, on a scale of not less than one inch to a foot; the construction to be such, that the effect of the power may be varied according to the weight to be raised, in a manner different from any now known or in use, yet more simple and effectual; the GOLD MEDAL, or FORTY GUINEAS.

To

To be produced on or before the first Tuesday in February, 1791.

208. METAL ROPE OR CHAIN.

To the person who shall have invented a Chain or Rope of Copper, or other Metal, superior to any hitherto made, sufficiently flexible to work well, and IN ALL DIRECTIONS, over pullies, and which shall serve every purpose of a good Hempen Rope of at least two inches diameter, FIFTY POUNDS.

The Candidate to produce to the Society satisfactory CERTIFICATES that such Metal Rope or Chain has been used to advantage in manufactories, or large works, where Hempen Ropes have been hitherto employed.

The CERTIFICATES, and a Sample of the Metal Chain or Rope, not less than ten yards long, to be produced to the Society on or before the first Tuesday in November, 1790.

Although it is well known that the effect of the wind on Horizontal Sails is greatly inferior

inferior to that on those which move in a vertical direction, yet, as there are some circumstances and situations where it would be most convenient to erect an Horizontal Mill, the Society do therefore offer the following Premium.

209. HORIZONTAL WINDMILL.

To the person who shall invent and produce to the Society a Model of an Horizontal Windmill, on a scale of not less than one inch to a foot, superior to any now in use, and in the construction of which particular regard is had to the preservation of the Machine in high winds, the Mill still continuing to act; the GOLD MEDAL, or THIRTY GUINEAS.

To be delivered to the Society on or before the first Tuesday in February, 1791.

210. HAND MILL. To the person who shall produce to the Society a better constructed Hand Mill, for general purposes, than any now known or in use, the SILVER MEDAL, or TEN GUINEAS.

To

To be delivered to the Society on or before the last Tuesday in December, 1790.

211. MACHINE FOR RAISING COALS, ORE, &c. &c. To the person who shall invent a Machine for raising Coals, Ore, &c. from Mines, which shall produce the effect at a less expence than those already known or in use, the GOLD MEDAL, or FORTY GUINEAS.

A MODEL of the Machine, made on a scale of not less than one inch to a foot, to be produced to the Society on or before the second Tuesday in February, 1791.

212. MACHINE FOR RAISING WATER. To the person who shall invent a Machine on a better, cheaper, and more simple construction than any hitherto in use, for raising Water out of Wells, &c. from a depth not less than fifty feet, THIRTY GUINEAS.

CERTIFICATES of the performance of the Machine, and a Model of it, on a scale
of

of not less than one inch to a foot, to be produced to the Society on or before the first Tuesday in February, 1791.

213. MACHINE FOR CLEARING RIVERS. For the best Model of a Machine, superior to any now in use, for clearing Navigable Rivers from Weeds at the least expence, TEN GUINEAS.

To be produced to the Society on or before the first Tuesday in February, 1791.

214. METHOD OF EXTINGUISHING FIRES. To the person who shall produce to the Society the most speedy and effectual method of extinguishing Fires in Houses or other Buildings, superior to any hitherto known or in use, the GOLD MEDAL, or FORTY GUINEAS.

To be produced on or before the second Tuesday in February, 1791.

215. IMPROVEMENT OF WHEEL CARRIAGES. To the person who shall

Z discover

discover to the Society the principles, and point out the construction, upon which Wheel Carriages may be drawn with the least fatigue to the horse or horses employed, the GOLD MEDAL, or FIFTY POUNDS.

The CLAIMS to be delivered to the Society on or before the second Tuesday in December, 1791.

*Premiums offered for the Advantage of the
British Colonies.*

216. NUTMEGS. For the greatest quantity of merchantable Nutmegs, not less than ten pounds weight, being the growth of his Majesty's dominions in the West Indies, and equal to those imported from the Islands of the East Indies, the GOLD MEDAL, or ONE HUNDRED POUNDS.

Satisfactory CERTIFICATES, from the Governor, Lieutenant-governor, President of the Council, or Speaker of the House of Assembly, of the place of growth, with an account of the number of trees, their age, nearly the quantity of fruit on each tree, and the manner of culture, to be produced on or before the first Tuesday in December, 1790.

217. The same premium is extended one year further.

CERTIFICATES to be produced on or before the second Tuesday in December, 1791.

N. B. Any person desirous of information on the subject of Nutmeg-trees, may obtain it from a Memorial on the Fructification of the Nutmeg, and the surest method of cultivating it to advantage, by the King's Gardener at the Isle of Bourbon, inserted in Mr. Maty's Review for August 1783.

218. CINNAMON. For importing into the port of London, in the year 1790, the greatest quantity, not less than twenty pounds weight, of Cinnamon, being the growth of some of the Islands in the West Indies belonging to the Crown of Great Britain, and equal in goodness to the Cinnamon brought from the East-Indies, the GOLD MEDAL, or FIFTY POUNDS.

SAMPLES, not less than two pounds weight, with CERTIFICATES that the

whole quantity is equal in goodness; together with satisfactory CERTIFICATES, signed by the Governor, Lieutenant-governor, President of the Council, or Speaker of the House of Assembly, of the place of growth, with an account of the number of trees growing on the spot, their age, and the manner of culture; to be produced to the Society on or before the first Tuesday in January, 1791.

219. The same premium is extended one year further.

The SAMPLES and CERTIFICATES to be produced on or before the first Tuesday in January, 1792.

220. BREAD-FRUIT TREE. To the person who, in the year 1790, shall convey from the Islands of the South Sea, to any of the Islands in the West Indies subject to the Crown of Great Britain, the greatest number, not fewer than six, of one or both species of the Bread-fruit Tree, in a growing state, the GOLD MEDAL.

CERTIFICATES, signed by the Governor or Lieutenant-governor of the Island, of the importation of the trees, and of the state they were in at the time of signing such Certificates, to be delivered to the Society on or before the second Tuesday in October, 1791.

221. The same premium is extended one year further.

CERTIFICATES to be produced on or before the second Tuesday in October, 1792.

222. The same premium is extended one year further.

CERTIFICATES to be produced on or before the second Tuesday in October, 1793.

223. SENNA. To the person who shall import into the port of London, in the year 1790, the greatest quantity of Senna, not less than two hundred weight, the growth of any of the British Islands in
the

the West Indies, and equal to the ALEXANDRIAN SENNA now used for medicinal purposes, the GOLD MEDAL.

CERTIFICATES of the growth and method of culture to be produced to the Society on or before the first Tuesday in February, 1791.

224. KALI FOR BARILLA. To the person who shall have cultivated in the Bahama Islands, or any other part of his Majesty's dominions in the West Indies, in the year 1789, the greatest quantity of land, not less than five acres, with Spanish Kali, fit for the purpose of making Barilla, the GOLD MEDAL.

225. For the next greatest quantity, not less than three acres, the SILVER MEDAL.

CERTIFICATES, signed by the Governor, Lieutenant-governor, or other chief Magistrate, of the quantity of land so cultivated, and of the state of the Plants at the time of signing such Certificates, to be delivered to the Society on or before the second Tuesday in November, 1790.

226, 227. The same premiums are extended one year further.

CERTIFICATES to be delivered on or before the second Tuesday in November, 1791.

228, 229. The same premiums are extended one year further.

CERTIFICATES to be produced on or before the second Tuesday in November, 1792.

230. CASHEW GUM. To the person who, in the year 1790, shall import into the port of London, from any of the British Islands in the West Indies, the greatest quantity, not less than half a ton, of the Gum of the Cashew-tree, which on trial has been found to answer the purpose of Gum Senegal, in Silk-dying, &c. the GOLD MEDAL, or THIRTY GUINEAS.

A SAMPLE, not less than twenty pounds weight, and CERTIFICATES that the whole quantity is of the same quality, and free
from

from leaves and dirt, to be produced to the Society on or before the second Tuesday in January, 1791.

231. The same premium is extended one year further.

CERTIFICATES and SAMPLES to be produced on or before the second Tuesday in January, 1792.

Society's Office, Adelphi, May 25, 1790.

Ordered,

THAT THE SEVERAL CANDIDATES AND CLAIMANTS TO WHOM THE SOCIETY SHALL ADJUDGE PREMIUMS OR BOUNTIES, DO ATTEND AT THE SOCIETY'S OFFICE IN THE ADELPHI, ON THE LAST TUESDAY IN MAY, 1791, AT TWELVE O'CLOCK AT NOON, TO RECEIVE THE SAME; THAT DAY BEING APPOINTED BY THE SOCIETY FOR THE DISTRIBUTION OF THEIR REWARDS: AND BEFORE THAT TIME NO PREMIUM OR BOUNTY WILL BE DELIVERED, EXCEPTING TO THOSE WHO ARE OUT OF THE KINGDOM, OR PREVENTED BY UNAVOIDABLE ACCIDENTS.

IN CASES WHERE PERSONAL ATTENDANCE CANNOT BE GIVEN, DEPUTIES MAY BE SUBSTITUTED TO RECEIVE THE REWARDS.

GENERAL

GENERAL CONDITIONS.

NOTWITHSTANDING the Society reserve to themselves the power of giving, in all cases, such part only of any Premium as the Performance shall be adjudged to deserve, or of withholding the whole, if there be no merit; yet the Candidates may be assured the Society will always judge liberally of their several Claims.

It is required that the matters for which Premiums are offered, be delivered in without names, or any intimation to whom they belong; that each particular thing be marked in what manner each Claimant thinks fit, such Claimant sending with it a paper sealed up, having on the outside a corresponding mark, and on the inside the Claimant's name and address: and all Candidates are to take notice, that no Claim for a Premium will be attended to, unless the conditions

348 GENERAL CONDITIONS.

conditions of the Advertisement are fully complied with.

No Papers shall be opened, but such as shall gain Premiums, unless where it appears to the Society absolutely necessary for the determination of the Claim: all the rest shall be returned unopened, with the Matters to which they belong, if inquired after by their Marks, within two years; after which time, if not demanded, they shall be publicly burnt, unopened, at some meeting of the Society.

All Models of Machines, which obtain Premiums or Bounties, shall be the property of the Society,

All the Premiums of this Society are designed for that part of Great Britain called England, the dominion of Wales, and the Town of Berwick upon Tweed, unless expressly mentioned to the contrary.

The

GENERAL CONDITIONS. 349

The Claims shall be determined as soon as possible after the delivery of the Specimens.

No person shall receive any Premium, Bounty, or Encouragement, from the Society, for any Matter for which he has obtained, or proposes to obtain, a Patent.

A Candidate for a Premium, or a person applying for a Bounty, being detected in any disengenuous method to impose on the Society, shall forfeit such Premium or Bounty, and be deemed incapable of obtaining any for the future.

The Performances which each year obtain Premiums or Bounties, are to remain with the Society until the end of May, except as mentioned in the Conditions annexed to the Premiums offered for promoting the Polite Arts.

No Member of this Society shall be a Candidate for, or entitled to receive, any
Premium,

350 GENERAL CONDITIONS.

Premium, Bounty, or Reward whatsoever, except the Honorary Medal of the Society.

Where Certificates are required to be produced in claim of Premiums, they should be expressed, as nearly as possible, in the words of the respective advertisements, and should not be from the Candidate (solely), but from some other person or persons who have a positive knowledge of the facts certified.

Where Premiums or Bounties are obtained in consequence of specimens produced, the Society mean to retain such part of those specimens as they may judge necessary, making a reasonable allowance for the same.

No Candidate shall be present at any meetings of the Society or Committees, or admitted at the Society's Rooms, after they have delivered in their Claims, until such Claims are adjudged, unless summoned by the Committee.

N. B.

GENERAL CONDITIONS. 351

N. B. Any information or advice that may forward the designs of this Society for the public good, will be received thankfully, and duly considered, if communicated by letter, addressed to the Society, and directed to Mr. MORE, the Secretary, at the Society's Office, in the Adelphi Buildings, London.

* * * In case any person should be inclined to leave a sum of money to this Society, by will, the following form is offered for that purpose :

Item. I give and bequeath unto A. B. and C. D. the sum of _____ upon condition and to the intent that they, or one of them, do pay the same to the Collector for the time being, of a Society in
London,

352 GENERAL CONDITIONS:

London, who now call themselves the Society for the Encouragement of Arts, Manufactures, and Commerce; which said sum of I will and desire may be paid out of my personal estate, and applied towards the carrying on the laudable designs of the Society.

By order of the Society,

SAMUEL MORE, Secretary:

E R R A T U M.

N. B As in several Copies of the Seventh Volume of these Transactions a material error occurs at page 90, where, after the word *turpentine*, the words *four pounds of hogslard* ought to be inserted; it is requested that those persons who may be possessed of that Volume will either correct the error with a pen, or apply to the bookseller of whom it was purchased, for a corrected leaf.

A L I S T

A
L I S T
O F

CONTRIBUTING MEMBERS.

N. B. Those marked with ** pay Five Guineas annually, those marked with * Three Guineas annually; those with P are Perpetual Members; those with †† have served the Office of Steward; and those with † are Stewards elect.

A.

A ILESBURY, Thomas Earl of
 †† Andrews, Sir Joseph, Bart. *Shaw, Berks*
 Arden, Right Honourable Sir Richard Peppar,
 M. P. Master of the Rolls.

Apreece, Sir Thomas, Bart.

Arkwright, Sir Richard, *Crumford, Derbyshire*

Abbot, Lemuel Francis, Esq. *Caroline-street,*
Bloomsbury

Abbott, Mr. Andrew, *Fleet-street*

Abdy, Rev. Thomas, *Cooper-sale, Essex*

A a

Adair,

- Adair, Alexander, Esq. *Pall-mall*
 Adam, James, Esq. *Albemarle-street*
 Adam, Robert, Esq. F. R. and A. S. *ditto*
 Adam, William, Esq. *ditto*
 Adamson, Mr. David, *Oxford-road*
 Addington, William, Esq. *Vine-street, Piccadilly*
 Affleck, Admiral Philip, *Wimpole-street, Cavendish-square*
 Affleck, Captain William, *ditto*
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 Aguilar, Honourable Ephraim, Baron, *Broad-street Buildings*
 P Alexander, Claud, Esq.
 Allen, Edward, Esq. *Clifford's-Inn*
 †† Allen, John, Esq. *Clement's-Inn*
 †† Allen, William, Esq. *Southampton-row*
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 Amyatt, James, Esq. M. P. *Margaret-street*
 Anderson, David, Esq. *York-street, St. James's-square*
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 P Annesley, Honourable Richard, *Dublin*
 Ansell, Mr. James
 P Antrobus, Edmund, Esq. *New-street, Spring-gardens*
 Armstrong, Mr. Mostyn John, *Norwich*
 P Arrow, Mr. James, *Rochester-row, Westminster*
 Artaud, Mr. William, *Cheyne-walk, Chelsea*
 † Ascough, George Merrick, Esq. *New-court, Temple*
 P Ashby,

P Afhby, Shuckbrugh, Esq. F. R. S. *Great Ormond-street*

Afhton, Mr. Isaac, *Arundel-street*

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Atkinson, Stephen, Esq. *ditto*

P Aubert, Alexander, Esq. F. R. and A. S. *Austinfriars*

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P Buchan, David Earl of, LL.D. F. R. and A. S.

Bristol, Right Rev. Frederick Earl of, F. R. S.

P Balgonie, Lord

P Barrington, Honourable Daines, F. R. and A. S.
Temple

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Berchtold, Honourable Count, *Prague in Bohemia*

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P Blackett, Sir Thomas, Bart.

Bridgeman, Sir Henry, Bart. M. P. *St. James's-square*

Bridger, Sir John, *Combe, Essex*

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†† Bacon, John, Esq. F. A. S. *Temple*

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 P Barclay, David, Esq. *Red-lion square*
 * Barclay, Robert, Esq. *Terrace, Clapham*
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 Baring, John, Esq. M. P. *ditto*
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 Bettefworth, Thomas, Esq. *Mark-lane*
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- Bishop, Nathaniel, Esq. *Cannonbury-lane, Islington*
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- Bray, Mr. John, *Wardour-street, Sobo*
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 * Brereton, Owen Salusbury, Esq. V. P. F. R. and
 A. S. *Sobo-square*
 P Broadhead, Theodore Henry, Esq. *Portland-place*
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 Brodie, Alexander, Esq. *Carey-street*
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 Browne, Francis John, Esq. M. P.
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 Brownlie, John, M. D. *Carey-street, Lincoln's-Inn*
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 Bullock, John, Esq. *Ordnance-office, Tower*
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 Burnett, Robert, jun. Esq. *ditto*
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 Burrow, Mr. Reuben, *East-Indies*

Butts, Mr. John, *Fleet-Street*
 Byfield, Mr. George, *Manchester-buildings*

C.

- **Cumberland, His Royal Highness Duke of
 P Cardiff, John Lord, F. A. S.
 Clermont, Earl,
 **Chaulnes, Monsieur le Duc de, *Paris*
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 † Compton, Lord, M. P.
 Cremorne, Thomas Lord Viscount
 P Conway, Right Honourable General Henry Sey-
 mour, M. P.
 Cavendish, Honourable Henry, F. R. and A. S.
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 nonville
 Chetwynd, the Honourable Richard
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 P Carnegie, Sir David, Bart. M. P.
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 Campbell, Duncan, Esq. *Adelphi*

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 land-place*
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 Clarke, Mr. Ebenezer, *Fleet-street*
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 Colborne, Thomas, Esq. *Queen Anne-street, West*
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- †† Collins, Thomas, Esq. *Berners-street*
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 Collins, Benjamin Charles, Esq. *Salisbury*
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 P Coningham, James, Esq. *Pancras-lane, Queen-street, Cheapside*
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 Copeley, Thomas, Esq. *Netherhall, near Doncaster, Yorkshire*
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 Coulson, Jukes, Esq. *Thames-street*
 Couffmaker, Lannoy Richard, Esq. *Warnford-court*

Couffmaker,

- Couffmaker, William Kops, Esq. *Hackney*
 Cox, Robert Albion, Esq. *Little-Britain*
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 Crathorne, Henry Ralph, Esq. *Yorkshire*
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Inn-fields*
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 Crawshay, William, Esq. *George-yard, Thames-street*
 Crawley, Samuel, Esq. *Argyle-street*
 Creak, Mr. William, *Cornhill*
 Crisp, John, Esq. *John-street, Adelphi*
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 Cropley, Rev. William, *West Ham*
 Crowder, William Henry, Esq. *Frederick's place,
Old Jewry*
 Curtis, William, Esq. Alderman, M. P. *Old South-
Sea-House*

D.

- **Devonshire, William Duke of
 **Dartmouth, William Earl of, F. R. S.
 P Dolben, Sir William, Bart. V. P. M. P. *Abingdon-
street*
 Dancer, Mr. John, *Doncaster*
 Daniell, James, Esq. *Portman-square*
 Darch, Lieut. Col. Thomas, *Gower-street, Bed-
ford-square*
 †† Davenport, John, Esq. *Tavistock-street, Covent-
garden*
Davenport,

- Davenport, Richard, Esq. *Lincoln's-Inn*
- * Davison, James, Esq. V. P. *Charles-street, Cavendish-square*
- D'Aubant, Lieut. Col. Abraham, F. A. S. *Harley-street*
- Dawes, John, Esq. M. P. *Pall-mall*
- Delafield, Joseph, Esq. *Castle-street, Long-acre*
- †† Delamain, John, Esq. *Margaret-street, Cavendish-square*
- Delamain, Henry, Esq. *Berners-street*
- Demorande, Charles, Esq. *Great Queen-street*
- Dent, Robert, Esq. *Temple-bar*
- Dent, John, Esq. *ditto*
- P Dent, William, Esq. *Battersea-rise*
- Defanges, Mr. William, *Wheeler-street, Spital-fields*
- Defensans, Noel, Esq. *Charlotte-street, Portland-place*
- Desbarres, Joseph Frederick Wallet, Esq. *abroad*
- Deformeaux, Mr. James Lewis, *Pearl-street, Spital-fields*
- Devall, Mr. John, *Portland-street*
- Devaynes, John, Esq. *Spring-gardens*
- Devins, Richard, Esq. *Wimpole-street*
- Dickinson, Charles, Esq. *abroad*
- Dickinson, Henry, Esq. *Lamb's-conduit-street*
- Dickinson, Mr. William, *Old Bond-street*
- Dickins, Anthony, Esq. *Lincoln's-Inn-fields*
- Digby, Kenelm, Esq. *Maddox-street,*
- Ditcher, Philip, Esq. *East Berghilt, Suffolk*
- Dixon, Marcus, Esq. *London-street, Fenchurch-street*

Dobbyn,

- Dobbyn, Hannibal, Esq. *Suffolk-street, Charing-cross*
 Doddsley, Mr. James, *Pall-mall*
 †† Dolben, John English, Esq. F. A. S.
 Dollond, Mr. Peter, *St. Paul's Church-yard*
 Dollond, Mr. John, *ditto*
 Donaldson Mr. James, *Great Queen-street*
 Douce, Thomas Augustus, Esq. *Townmaling, Kent*
 Douglas, Captain Peter, *abroad*
 †† Dower Robert, Esq. *Middle Temple*
 Dowbiggin, Mr. Lancelott, *Paternoster-row*
 Drake, George, Esq. *Bedford square*
 † Drake, William, jun. Esq. M. P. *Portman-square*
 Drake, Francis, Esq. *Wimpole-street*
 Drake, Mr. Samuel, *Margaret-street, Westminster*
 Draper, Mr. John, *Maze-pond, Southwark*
 Drew, Mr. Thomas, *Charlotte-street, Portland-place*
 P Dreyer, Mr. Maurice
 Duberly, James, Esq. *Soho-square*
 Dubufe, Mr. Claude, *Vincennes, near Paris*
 Dudley, the Rev. Henry Bate, *Bradwell-lodge, Essex*
 Dunn, Samuel, Esq. *Adelphi*
 Dunnage, Mr. John, *Philpot-lane*
 P Duroure, Lieutenant-Colonel, F. R. and A. S. *Old Burlington-street*
 * Duval, the Rev. Philip, D. D. *Newman-street*
 Duval, Mr. John Peter, *Hackney*

E.

- P Effingham, Thomas Earl of
 P Egremont, George Wyndham Earl of

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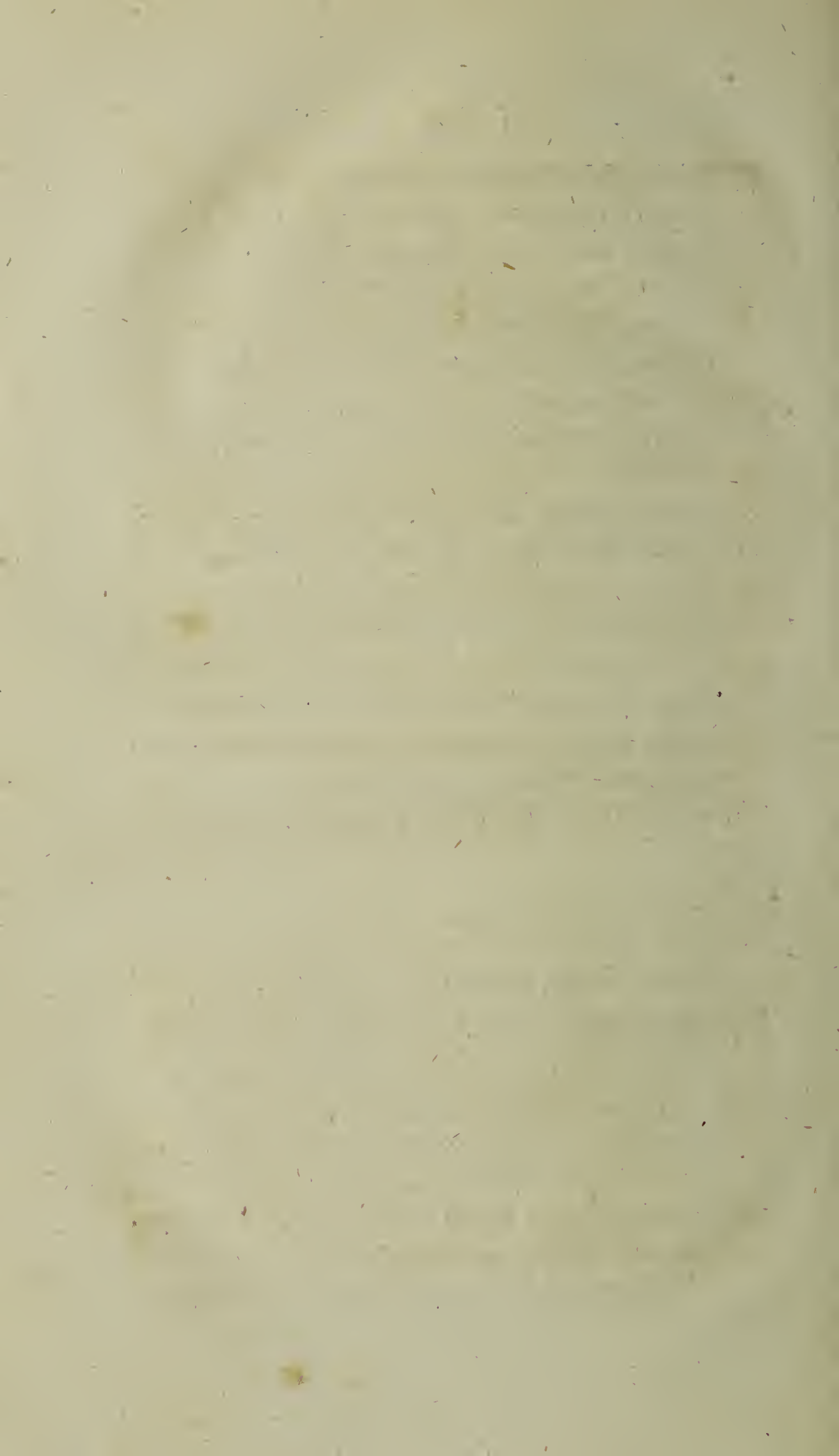
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I N D E X. 395

CORN, machine for reaping, premium offered for	300
COWLEY, Rev. Mr. certificate signed by	117, 118
COWLISHAW, Mr. Gold Medal to	6, 224
Letter from	7
Account of trees planted by	ibid.
CONDITIONS, GENERAL	346
CRAB-WEED, a plant so called	89
CUNLIFFE, Miss M. E. Silver Pallet to	230
CURLED POTATOE, papers on	18
Different stages of	19
Cause of	20, 31, 36, 39, 40
Experiments on	23, 45
Methods of preventing	24, 33, 37,
	38, n. 40, 43
What soil likely to produce	27
When first observed	44

D.

DANCER, Dr. Silver Medal to	208, 238
Letter from	211
Seeds sent to	ibid. n.
DANN, Mr. William, Silver Medal to	229
DANSEY, Lieutenant Colonel, letter from	188
Thanks to	ibid.
DRAWINGS, honorary premiums for	314, 315
Of Outlines	317
Of Machines	318
Of Landscapes	ibid.
Historical	319
DRILL HUSBANDRY, premium for	278
DRYDEN, John, premium to	182
DRY ROT, premium for preventing	309
	E.

E.

ELM, premium for, adjudged	9
offered for	260
EMBANKMENT, an object worthy encouragement	104
ENGRAVING, premium for	320
ENGLAND, the climate of, well adapted to Silkworms	164
ERRATUM	352

F.

FIR, SILVER, premium offered for	263
FIRES, method of extinguishing, premium for	337
FISH-OIL, premium for refining	306

G.

GENERAL CONDITIONS	346
GREAVES, Mr. Thomas, reward to	233
GREEN FOOD for Cattle, utility of	60, 62
Advantage of dung from	62
Premium for	279
GUISE, Miss Frances, Silver Medal to	230
GUM CASHEW, premium offered for	344
GUN-HARPOONS, certificates of the use of	181, 187
Rewards for	234, 236

H.

HANIN, Monsieur, reward to	235
HANMER, Sir Thomas, Silver Medal to	229
HARRIOTT, Mr. his embankment mentioned	103
Bounty to	233
HAY, use of, in securing land	96
HAYWARD, Mr. Silver Medal to	75, 227
HENRY, Dr. his method of generating Yeast	142
HOE, premium for,	301
HOGS, observation on breeding	32
HOLLINS,	

HOLLINS, Mr. premium to	18, 226
HOLT, Mr. John, premium to	18, 226
HONEY, when to be taken	127
Method of taking	132, 135
HORSES, premium offered for stall-feeding	286
HOPS, supposed to forward the generation of Yeast	146
HUGHES, Mr. Hugh, reward to	235
HUNT, Mr. Robert, Silver Medal to	231
HYDROMETER for Spirits and Worts	196
Description of	198
Directions for use of	199—203

I.

JACK, paper on an improved	179
JAMAICA, account of Cinnamon in	212
Is the true kind	213
IRELAND, Mr. account of beasts sold by	58
IRON, premium offered for	310
ITHANCESTRE, a Saxon city	83

K.

KALI, seeds of, sent to Jamaica	211 n.
premium offered for	343
KELP, premium offered for	304

L.

LANE, Mr. premium to	122, 228
Letter from, on Bees	122
LAND gained from the Sea, premium adjudged for	83
Premium offered for	298
Letters on	83—113
Dimensions of wall	92, 116
LAND	

LAND gained from the Sea, Plants sown on	100
Cautions to secure it	101
Expence of embanking	106, 115
Sketch of	121
Premium offered for im- proving	293
LANDAFF, Bishop of, Gold Medal to	15, 225
LARCH, premium for, adjudged	9, 13
offered for	262
Account of, planted in 1788	16
Observations on	17
LEE, Mr. Thomas, Silver Medal to	114, 228
LESHLEY, George, premium to	185
LIST of Members	353
Officers	249
LOCHÉE, Mr. J. C. Silver Medallion to	231
LONG, Mr. paper received from	208
Thanks to	ibid.
LOOM, letter on a new improved	167
Advantages of	168
Description and plate of	172

M.

MACHINES and MODELS, list of	245, 248
M'ENZIE, Mr. Colin, bounty to	237
MANLEY, Mr. premium to	122, 229
Letter, from on Bees	130
MANN, James, certificate signed by	11
MANUFACTURES, paper in	163
MANURES, premium offered for	294, 296

MARSHALL,

I N D E X. 399

MARSHALL, Mr. Tim. bounty to	236
MASON, Reverend William, letters from	141
Thanks to	ibid.
MILNES, Richard S. Esq. two Gold Medals to	9, 224, 225
MODELS and MACHINES, catalogue of	245—248
MOCOCK, Mr. bounty to	179, 235
Plate and description of his Jack	180
MOORE, Mr. Charles, premium to	236
MOORS enclosing, an object worthy encouragement	104
Improving, premium offered for	297
MORLE, Mr. Richard, certificate signed by	74
MORSE, John, Esq. Gold Medal to	3, 224
Letter from	5
MULBERRY CUTTINGS, premium offered for	269
TREES in hedges	271
MUNDELL, Mr. certificate signed by	109

N.

NOVIUS, subdivision of	175
NOYES, Mr. Thomas, premium to	59, 227
Letter from	65
NUTMEGS, premium for importing	339

O.

OAKS, premium offered for	257
Observations on, premium for	258
OFFICERS of the Society, list of	249, 250

P.

PAKENHAM, Captain, Gold Medal to	234
PANS on Salt-marshes, what so called	88

PILKINGTON,

PILKINGTON, Mr. James, reward to	232
PITT, Mr. William, premium to	18, 226
PONDS, letter on draining	188
Description and plate of a machine for	191
PORTRAIT, premium for	316
POTATOES, premium for, adjudged	18
Cure of Curled, premium offered for	282
Early setting of recommended	26, 39
When to be planted <i>whole</i>	27
Best soil for	27, 50
Caution concerning	28, 31, 33
Various sorts named	34, 41
Seed, obtained from moss land	38
Different disorders of	39
Productive kind	42
When first introduced	43
For feeding cattle, paper on	48
Premium offered for	283
Expences of planting	50
Produce	51
Mode of preserving	51
Of feeding with	52
PREMIUMS, list of	253
PRESENTS, list of, received	239—244
PRESGRAVE, Mr. premium to	48, 227

Q.

QUAYLE, Thomas, Esq. Gold Medal to	83, 228
QUIN, Mr. Matthew, bounty to	193, 238
Memorial from	195
His hydrometer described	196
	R.

I N D E X.

401

RAPER, Miss C. C. greater Silver Pallet to	230
REWARDS bestowed, list of	221
RHUBARB, premium adjudged for	66, 75
Method of drying	67, 82
Price of	67
Answers all purposes of Turkey	67, 78
Mode of culture	68, 72, 79, 81
Size of roots	68, 70
Bark of, used	69
Preparations of	70
Cultivated by off-sets	81
Method of cure	81
Premium offered for	289, 290
RIVERS, Machine for clearing, premium for	337

S.

SALTINGS, what	87
SCULPTURE, premium for	316
SEA-WALL, dimensions of	92
Price of making	94
SEEDS, premium offered for preserving	305
SENNA, premium offered for	342
SENYOR, Joseph, bounty to	141, 229
SHEEP and CATTLE, premium offered for feeding	285
SHOLL, Mr. bounty to	166, 233
SILK, may easily be produced in England	163
Five pounds produced	164
From 5000 worms	164
SMITH, Miss Emma, Gold Medal to	231
SMOKE, premium offered for destroying	305
SOILS, planting boggy, premium for	273
SPARKS, Reverend Mr. certificate signed by	124
STEAM, premium for increasing	308

D d

STEEL,

STEEL, John, premium to	182
STEPHENSON, Matthew, Esq. Silver Medal to	223
STEWART, Mr. R. certificate signed by	57
STOCKS, see Bees	
SUMMERS, Michael, premium to	182
SURVEYS of counties, premium for	320
SWAYNE, Reverend George, Silver Medal to	232
SYLVESTER, Mr. bounty to	235

T.

TARES, drill-fowing of, recommended	60
Horses &c. fed with green	61
Advantage of	63
TILLINGHAM CREEK	91
TITFORD, Dr. Gold Medal to	238
TURNEPS, premium for	279
TURNEP-ROOTED CABBAGE, premium for	280, 281
TREES, various, planted	3, 10, 15
Mixed Timber, premium offered for	268
For use when exposed to the weather, premium for	272

W.

WHALES taken by Gun-Harpoon	183
Rewards for	234, 236
WHEAT, premium for cultivating	274, 275
WHEATLEY, Captain John, letter from	185
WHEEL-CARRIAGES, premium for improving	337
WHELDON, John, premium to	183
WHITE, Thomas, Esq. letter from	11
WHITE LEAD, premium offered for	311
WILKINSON, Thomas, premium to	182

WILLOW,

I N D E X. 403

WILLOW, Huntingdon, premium offered for	264
Upland, or Red, premium offered for	265
WIRE-WORM, premium for destroying	302
WRIGHT, Mr. George, Silver Medal to	13, 225

Y.

YEAST, letters on generating	141
Fixed air not necessary to	142
Circumstances to be attended to in gene- rating	143
Process for generating	144
Degree of heat necessary	145
Hops useful in	146
Definition of	147
Premium offered for	307
YOUNG, Mr. Gilbert, certificate signed by	55

DIRECTIONS TO THE BOOKBINDER.

Place the Elevation of the Society's House as the Frontispiece to this Volume.

The Plate of the Silk-Loom, improved by Mr. Samuel Sholl, to face page 172.

The Plate of a Jack for raising large Weights, improved by Mr. Moccock, to face page 180.

The Plate of the Machine for draining Ponds without disturbing the Mud, to face page 191.

The Plate of Mr. Quin's Hydrometer to face page 199.



